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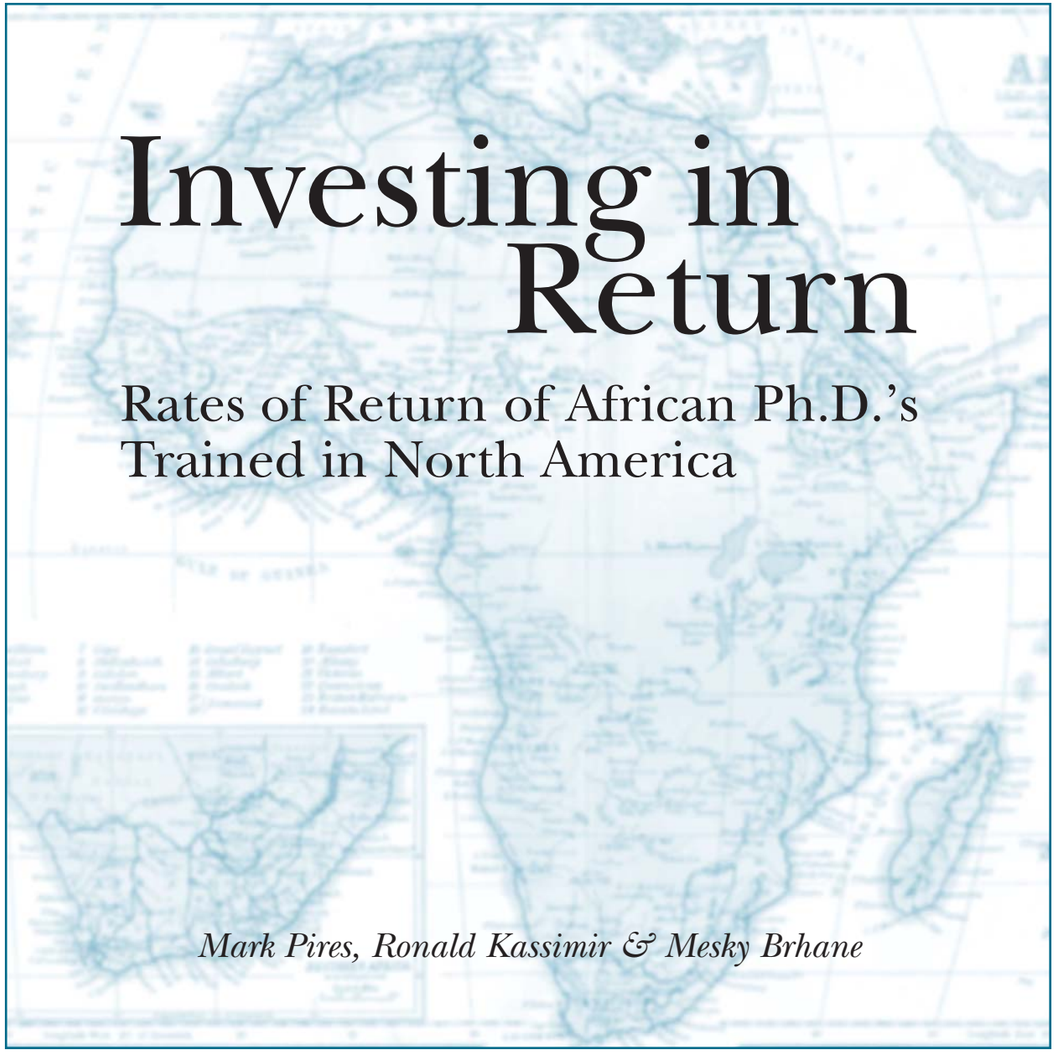

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INTRODUCTION

Building human capacity in Africa is addressed, in part, by donor initiatives that support the training of African Ph.D.'s at U.S. and Canadian universities in the natural sciences, social sciences, and humanities. Donor agencies have debated whether the support at non-African universities of African students at the doctoral level is a viable mechanism for contributing to development and capacity building in Africa. A key issue in this debate is whether Ph.D.'s return home upon completion of their training. Indeed, a strong perception exists that many Africans do not return, which leads donors to question their investments in programs for advanced graduate training. These perceptions of significant "brain drain," however, are largely anecdotal. While individual support programs may track the post graduation professional activities of their fellows, there has been no collection, let alone analysis, of aggregate data against which to gauge "success" in terms of return rates.

It was with the goal of producing such an aggregate-level data set that the Rockefeller Foundation approached the Social Science Research Council to conduct the present study. Such information is particularly useful to donors, universities in North America, and African institutions, as it provides a baseline with which to assess existing programs in terms of both return rates and aspects of these programs that might facilitate return. Our study offers the first comprehensive analysis of its kind by surveying Africans who have earned Ph.D.'s in North American universities, and in documenting actual return rates rather than stated intentions. It calculates the number of African Ph.D.'s produced over an 11 year period (1986-1996) and the rate at which they return to Africa. As we will discuss in detail in following sections, the return rate in our survey is 57%, and 62% if we include Africans who have returned to the continent but not to their home countries.

More broadly, we establish correlations between rates of return and a range of variables, including the home country of the degree holder, age and gender, field of study, the institution conferring the degree, and the type of funding for graduate study obtained. In addition, the study provides data on

the type of employment held by Africans who earned Ph.D.'s in North America. While the analysis does not establish causal relationships between these variables and the rate of return, it does provide a base from which to begin considering causal mechanisms, and to reconsider certain assumptions about the magnitude and significance of the "brain drain."

The Goals of Advanced Graduate Training for Africans

Most major funding institutions provide support to Africans earning advanced degrees for an overarching purpose: to create and sustain an indigenous scientific and intellectual capacity to devise and implement programs for African development. While one major donor — the USIA's Fulbright Program — has cross-cultural understanding as a primary goal, all funders expect that the production of Ph.D.'s will, as a first priority, contribute to development on the continent of Africa. Contributions to the technical and intellectual capacity of the United States, Canada, or the international community in general are welcome to the degree that they are a by-product of the Africa-related professional activity of Ph.D.'s. For the most part, it is assumed that a necessary component of this process is that a significant cohort of these scholars will return home and take up responsible positions in universities, research institutes, government ministries, non-governmental organizations, or the private sector.

As we discuss in the concluding sections of this report, return rates are an important window on this process, but one with distinct limits. First, data on the "brain drain" tell us little about how and to what degree Africans who stay outside their home countries may still contribute to development and capacity building back home. Second, the fact of return is not by itself a guarantee that African Ph.D.'s will effectively contribute to these goals through engaging in the kinds of professional activity for which they were trained. In both instances, we might inquire: to the degree that we accept the much debated notion of globalization, in what ways does location still matter in a world of more intensive and expansive flows of financial and human capital and improved communication technologies?

Third, a focus on the "brain drain" — defined as the rate of non-return — may detract attention from the absolute numbers of Ph.D.'s being produced. In other words, a higher percentage of return

may not result in greater absolute numbers returning to the region if reductions in overall funding, or a re-allocation of resources away from doctoral training, means that fewer Africans are in the Ph.D. pipeline. This is a classic chicken-and-egg issue since one justification for reduced support is that return rates are (perceived to be) too low. The value of our study is that it provides data on actual return rates. But perhaps the more difficult question is establishing what rate is "high enough," and what response is appropriate if actual rates are below what is seen as acceptable. In other words, is the return to the continent of nearly two-thirds of Ph.D. recipients over an 11-year period a sign of successful program interventions, a signal that one needs to reconsider whether supporting doctoral level study at non-African institutions is an efficacious way to build human capacity in Africa, or an indication of the need to redesign programs to include mechanisms that foster the likelihood of return?

As we also discuss below, the emphasis on development leads to a broad convergence in the fields of study prioritized by those organizations that commit funds for training future African Ph.D.'s. Thus, our study finds that agriculture, education, the biological sciences, and engineering (and, to a lesser extent, health and population) are the predominant fields of study among those Ph.D.'s in our survey and are most emphasized by support programs. Accepting for present purposes that there is a strong correlation between these fields and "objective" needs on the continent, it is still unclear whether productive employment opportunities exist in the region for Africans trained in these fields. Donors have dealt with this issue in two ways. The first is additional donor funding for institutions in the region that employ African Ph.D.'s trained in North America. Second, donors have attempted to design their programs to increase the likelihood of return. While we do refer to these efforts in this study, we also emphasize that they are likely to have an impact only at the margins given the economic, political, and institutional conditions in many African countries (which often serve as impediments to return and indeed often overdetermine the return options of individuals) and existing labor markets for highly trained professionals worldwide. With all these caveats recognized, our study does allow for some comparison of the rates of return of various capacity building programs to the aggregate data and to each other. Such comparisons can be part of broader assessments of the impact of specific interventions on returning trained manpower to the continent.

STUDY OBJECTIVES & PROCEDURES

Developing a Database on African Ph.D. Recipients

This study was conceived to address the dearth of empirical data on the postgraduation professional activity of African citizens who receive advanced graduate training in North American universities.[1] There does not exist a single, easily accessible database offering information about the actual (rather than speculative) postgraduation movements of African doctoral recipients. Little factual information is available on where African Ph.D.'s trained in the United States and Canada reside, the work they do, or their institutional affiliations. Since such information would be of value to numerous organizations (both within and outside the continent) involved in training the next generation of African professionals, the primary purpose of this study is to present, to the extent possible, the available facts about the professional activities of African doctoral recipients.

A key element of this endeavor is to determine the whereabouts of a sample of African Ph.D. graduates. To this end, the pivotal piece of information we sought for a sample of African citizens who received their doctoral degree during the period 1986-1996 was current country of residence. We are interested in knowing the proportion of African Ph.D.'s who return to their home countries vis-a-vis the proportion who either stay in North America after their studies are completed or take up residence in some other location.

In addition to the geographic variable, we set out to collect information relevant to graduates' employment and professional affiliations. Such information may provide some insight into whether the training provided to citizens of Africa is suited to prevailing employment opportunities and the professional activity in which they are actually engaged after graduation.

Study Population and Sample

In order to conduct as informative a study as possible given the resources and time at our disposal, we limited our study to citizens of sub-Saharan Africa awarded the Ph.D. during the period from 1986 to 1996 inclusive.[2] This time frame allows us to avoid problems associated with degrees conferred more recently, such as pending data processing at universities and sponsoring organizations, as well as problems of obtaining information on individuals who earned their degrees prior to 1986.

According to the Survey of Earned Doctorates sponsored by the National Science Foundation, a total of 4,855 citizens of sub-Saharan African countries received the Ph.D. from 219 universities in the U.S. during the period 1986-1996.[3] In Canada, the University Services Branch of Statistics Canada records a total of 682 doctoral degrees awarded to sub-Saharan Africans for the same period.[4] Therefore, the total population for our study is 5,537 sub-Saharan African graduates.

Given this relatively large universe of Ph.D. recipients, we decided to conduct our rate of return survey based on a smaller sample of graduates. In the case of U.S. universities, we chose to survey the 54 schools graduating 30 or more Ph.D.'s for the period. The sum of Ph.D.'s at these institutions is 3,060, or 63% of the U.S. total. For Canada, the decision concerning which institutions to survey had to be made prior to receipt of overall graduation data from Statistics Canada. Consequently, instead of basing our sample selection on knowledge of the actual number of Ph.D.'s conferred, we selected 15 universities to include in our survey based on strong levels of recent African doctoral enrollments reported to us by the Association of Universities and Colleges of Canada. Upon later comparison with the Statistics Canada data, it turns out that these 15 schools account for approximately 75% of all graduates for the period from Canadian institutions. A list of the schools surveyed in both the United States and Canada is included in the Appendix (see Table A-2).

Data Collection

Sources of information for this study are numerous, diverse, and, unfortunately, highly decentralized. In many instances, the data we sought were simply not available or not maintained in a conveniently retrievable format. Efforts to collect data from universities often required soliciting the cooperation

of several offices at the same institution such as those of the graduate deans, international students, and alumni associations. In some cases, our collaborators' concern for protecting the privacy and confidentiality of personal information resulted in a refusal to provide the requested information or, occasionally, to provide it only in a more aggregated format.

In addition to university contacts, we extended our data collection efforts to include other collaborators likely to have information relevant to the study. For the most part, this group consisted of organizations that either finance and/or administer scholarship and other funding mechanisms that facilitate doctoral training for African citizens in North America. Examples include the African-American Institute, the United States Information Agency, the Kellogg Foundation, the World Bank, and the Canadian International Development Agency. It is worth noting here that, in general, these organizations tend to maintain better postgraduation information on their grantees than the universities do on their former students. We also contacted American diplomatic posts in Africa (U.S. Information Service offices) for follow-up information regarding former Fulbright Scholarship recipients. The Appendix contains a complete list of survey participants and explanations of the programs they sponsor (see Table A-3).

As mentioned earlier, we obtained additional data collected for the NSF Survey of Earned Doctorates from the National Opinion Research Center at the University of Chicago. We intended to compare our survey data with the data for the overall population of African Ph.D. recipients from the NSF. However, comparisons are constrained in many instances due to Federal regulations restricting the level of detail with which the NSF data may be disseminated. Given that the number of Ph.D. recipients from many of the countries in our study is very small even over the entire 11-year period, we were denied access to much of the data we sought on a disaggregated basis.[5]

Survey Instrument

Data collection for the study was achieved through the design and distribution of a multivariable survey instrument. Two versions of the survey were produced, one for the sample universities, and a slightly modified version for funding and diplomatic agencies on which different university affiliations could be noted. Copies of the survey instrument are included in the Appendix (see Table A-4).

For each Ph.D. recipient, data were requested for a number of variables. These included: degree granting university; field of study; primary source of funding for graduate study; country of citizenship; year of degree and year of birth (from which age at degree was calculated); gender; and current country of residence, occupation, and institutional affiliation.[6]

Regarding citizenship, our survey includes individuals who were citizens of a sub-Saharan African country at the time of graduation. No further information is included in the survey concerning specific immigration status, i.e., immigrant or non-immigrant visa, either before or after graduation. Immigration issues, however, can obviously influence return/stay rates, and efforts to obtain such information would be worthwhile in any future analysis. Aggregate data from the NSF Survey of Earned Doctorates for the population of African citizens earning Ph.D.'s during the study period indicate that 75% reported holding temporary non-immigrant visas, and 25% reported having permanent resident immigration status.

Information from completed surveys was checked for accuracy and entered as received into our database. Prior to analysis, the data were again verified for completeness and examined to eliminate any redundant or invalid entries. Data were then coded into a manageable number of categories to facilitate analysis. This was particularly important for the funding source, field of study, occupation, and affiliation variables.

For the key variable on current country of residence, the coding scheme includes five categories. These are: 1) Home, i.e., return to country of citizenship, 2) Africa, i.e., return to an African country other than that of citizenship, 3) Stay, i.e., residence in the country where doctoral degree was obtained (Stay cases were also coded for graduates from U.S. institutions now residing in Canada, and vice versa), 4) Europe, i.e., residence in any European country, and 5) Other, i.e., residence in any other country.

Data Quality and Limitations

The number of cases reported by all survey respondents, both university and non-university related combined, initially totaled 1,842. However, deletion of redundant and faulty entries reduced this number to 1,708 valid cases for degrees granted in both the U.S. and Canada. At the time we con-

ducted the data analysis, completed surveys were received from 27 of the 54 U.S. universities in our sample (a 50% response rate). The number of U.S.-granted Ph.D.'s accounted for in these surveys is 1,423 (47% of the 3,060 doctorates conferred by the 54 U.S. institutions). In addition, the database includes information provided by our non-university collaborators for another 176 doctorates granted by U.S. institutions that were not included among the 54 selected to receive the survey. These additional cases boost the total number of U.S.-granted Ph.D.'s in the database to 1,599 (which accounts for 33% of the 4,855 awarded to sub-Saharan African citizens at all U.S. institutions for the period 1986-1996).

Due primarily to delays in data collection, the number of African Ph.D.'s included in the study from Canadian universities is significantly lower than that for graduates from U.S. institutions. At the time of data analysis, completed surveys were returned by only 3 of the 15 sample institutions (a 20% response rate). The number of Ph.D. recipients from Canada included in the study is 109, or 16% of total Ph.D. production for the 1986-1996 period. For Canada, most of the data was provided by non-university collaborators such as the International Development Research Centre in Ottawa and other sponsorship organizations.

Despite the difficulties related to data availability and retrieval mentioned earlier, we have been able, with 1,708 valid cases, to assemble a significant amount of information. For example, current residence status is reported for 65% of all cases, occupation and institutional affiliation is known for 47% of cases, source of graduate funding is accounted for in 52% of the cases, age at degree and gender information is reported in 77% and 93% of the cases respectively, and field of study is reported in 98% of all database entries.

The number and reasonable quality of database entries notwithstanding, some mention of limitations is in order. First, although current country of residence, i.e., return status, is reported in nearly two-thirds of all cases, it is very difficult to judge exactly how much confidence we can place in the accuracy of this information. At face value, "current" in this study is perhaps best interpreted in terms of an individual's "last known whereabouts." In most instances, residence information is not accompanied by a reference year.[7] Consequently, it is possible that some cases reported as Home are no longer resident in their home country and, conversely, that some reported as Stay have actually returned home or moved to some Other location. Given this situation, a more complete picture of

actual career trajectories over time would be of enormous value, as would follow-up interviews with or the distribution of questionnaires to a sample of African Ph.D. recipients in both the Return and Stay categories.[8] The required research effort entailed in doing this, however, is well beyond the scope of the present study.

A second caveat relates to the incompleteness of many database entries. The fact that values are missing for any given number of variables in any given number of individual records hinders cross-comparisons of the data where one would wish to analyze more than two variables simultaneously.

ANALYSIS & FINDINGS

An Overview of African Ph.D.'s from North American Universities

In our initial analysis of the data, tabulations were prepared for cases with known return status crossed with the following variables: age at degree, gender, nationality, field of study, funding source, and degree granting institution. Summary findings are presented below.

Overall Rates of Return

Knowledge of the return status of African Ph.D.'s in the survey is based on 1,110 cases (65% of the total) for which this information was reported.[9] An overall account of return status reveals: 57% of graduates reside in their home country; 5% are located in another African country; 36% have stayed in North America; and 2% reside in some other location (see Table 1).

Based on year of graduation, the return/stay ratio varies between 2.7:1 for the years 1986 and 1993, and 1.1:1 for 1988 and 1996 (see Table 2).[10] Despite the suggested decline in the rate of return to home country based on the two years that anchor the study, there is no well defined trend in the data. The higher 1996 Stay rate could be explained by recent graduates taking on either post-doctoral or temporary faculty positions based in North America.[11] For most other degree years, the return/stay ratio is close to the period average of 1.7:1.

TABLE 1: Return Status for All Ph.D.'s in Survey, 1986-1996

	HOME	AFRICA	STAY	EUROPE	OTHER	UNKNOWN	TOTAL
NUMBER OF PH.D.'S (N)	629	58	401	3	19	598	1,708
PERCENT OF KNOWN CASES (N=1,110)	57%	5%	36%	0%	2%		

In this and all subsequent tables, return status is defined as follows: "Home" – country of citizenship; "Africa" – any African country other than that of citizenship; "Stay" – either the USA or Canada; "Europe" – any European Country; "Other" – any other country outside Africa, Europe, and North America. For the data analysis, return status of "Europe" and "Other" were combined in a single category denoted as "Other".
SOURCE: SSRC Rate of Return Survey, 1998.

TABLE 2: Return Status by Degree Year for All Ph.D.'s in Survey, 1986-1996

RESIDENCE	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	TOTAL
HOME	64%	65%	48%	55%	54%	52%	53%	69%	60%	59%	48%	57%
AFRICA	7	5	4	7	7	9	8	3	5	3	3	5
STAY	26	30	45	37	39	37	37	27	33	37	46	36
EUROPE	0	0	0	0	0	0	1	0	0	0	1	0
OTHER	3	0	3	1	0	2	2	1	3	2	2	2

SOURCE: SSRC Rate of Return Survey, 1998.

Comparing the data on overall rates of return reported in our survey with the stated intentions of Ph.D. recipients declared at the time of graduation offers an interesting contrast. Data from the NSF Survey of Earned Doctorates for the 1986-1996 period indicate that only 35% of sub-Saharan African Ph.D.'s intended to return to their home countries and 1% to another African country, and that 64% were planning to stay in the U.S.[12] The percentages reported on graduates' intentions, however, are almost the exact opposite of the observed outcomes based on our survey results noted above. One possible interpretation for this is that those who initially report intentions to stay upon graduation do so, but then subsequently go back to Africa and are thus reported as "returned" in our study (an example being those who held U.S.-based postdoctoral positions). Another possibility is that many graduates who initially intend to stay encounter difficulties (financial, legal, familial) in actually doing so, and ultimately return to their home countries.

One other study, conducted by the Oak Ridge Institute for Science and Education, finds return

rates for Africa that lie somewhere in between the results of our study and the NSF data that are based on intentions. This study developed a sample by using social security numbers to estimate the numbers of foreign students in Science and Engineering who earned income in the United States after receiving their Ph.D.'s. By extrapolating from their data tables, we find that among those Africans who earned science and engineering Ph.D.'s in 1990-91, 44% were working in the U.S. in 1995 (thus a 56% return rate).[13]

Citizenship and Rate of Return

It is reasonable to expect that the number of Ph.D. recipients from sub-Saharan African countries and their rate of return varies as a function of a given country's population, economic and political situation, and educational infrastructure, among other factors.[14] For the forty countries represented in our survey, four have more than 100 doctorates (two of these more than 200), six have between 51-100 doctorates, ten between 21-50 recipients, and the remaining 20 fewer than 20 each.[15] Doctoral recipients from 26 of the 40 countries exhibit rates of return to home country of 50% or greater; 22 countries are above the survey average of 57% for return to home country. Citizens from nine countries show stay rates of 50% or more; twelve countries are have stay rates higher than the survey average of 36%. Four nationalities (Ethiopia, Congo/Zaire, Rwanda, and Sudan) display a more dispersed pattern split between Home, Stay, and Africa locations.[16]

The analysis of return data by nationality is complicated by fairly large differences in the total number of Ph.D.'s attributed to each country and, further, by the number of these for whom return status is actually known.[17] Consequently, comparisons between countries should be made with caution. We are reticent in drawing inferences, especially for those countries where return/stay rates are based on a relatively small number of cases. For the remainder of this report we will draw examples mostly from the ten countries that have produced more than 50 Ph.D.'s (see Table 3). In descending order, these are Nigeria, South Africa, Ghana, Kenya, Sudan, Ethiopia, Cameroon, Tanzania, Uganda, and Zimbabwe. Citizens of these ten nations constitute 71% of the overall sample, and 66% of all cases with known return status.[18] The return rates for this list are 53% in home country, 4% elsewhere in Africa, 41% in North America, and 2% in some other location. The slightly lower return rates as compared to the overall survey are due to the fact that two of the top three countries

in terms of total Ph.D.'s — Nigeria and Ghana — have return rates well below the survey average.

TABLE 3: RETURN STATUS FOR TOP 10 PH.D. PRODUCING COUNTRIES IN SURVEY, 1986-1996

COUNTRY	TOTAL PH.D.'S	KNOWN RESIDENCE STATUS	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
NIGERIA	261	131	50%	34%	3%	62%	2%
SOUTH AFRICA	223	115	52%	67%	0%	30%	3%
GHANA	166	102	61%	34%	5%	61%	0%
KENYA	155	113	73%	65%	5%	28%	2%
SUDAN	92	62	67%	48%	5%	35%	11%
ETHIOPIA	89	53	60%	47%	4%	47%	2%
CAMEROON	62	40	65%	33%	5%	60%	3%
TANZANIA	58	43	74%	79%	2%	19%	0%
UGANDA	54	29	54%	79%	3%	17%	0%
ZIMBABWE	51	42	82%	83%	7%	10%	0%

SOURCE: SSRC Rate of Return Survey, 1998.

One other qualification to comparison is that, while employment opportunities and remuneration scales across African countries surely vary, the general picture is one in which a diverse set of disincentives to return are prevalent throughout the region. This is particularly the case for faculty positions at national universities, where salaries, research opportunities, and conditions of service are uniformly low. Thus, it is difficult, although not impossible, to infer that return to Country A is more likely than Country B given existing conditions for establishing a professional career. Political conditions vary more widely than economic or institutional ones. Thus, we surmise that inferences based on variation in return rates in terms of political stability and the type of regime in power can be

made with relatively more confidence.[19] Certainly, low return rates for countries in our survey that have experienced, and continue to face, major civil conflict conform to expectations, e.g., Sudan, Congo/Zaire, Liberia, Somalia, Sierra Leone, and Rwanda.

Among those countries with large numbers of Ph.D.'s in our sample, we observe that, for example, Tanzania, a country whose politics have remained largely stable over the study period, has a very high return rate (79%). Nigeria, whose political situation has been turbulent (to say the least) has a relatively low rate (34%). Given that Tanzania's economic status is certainly not stronger than Nigeria's, we can infer that political conditions and governance practices in the former has some role to play in higher return rates.[20] On the other hand, while the political situation in Kenya over the period under study has been no less unstable than in Cameroon, the former's return rate (65%) is almost twice that of the latter (33%). Non-political factors may come into play in interpreting this differential: Kenya's stronger economy, the relative strength and number of universities and independent research centers, and the presence of many international organizations that provide employment opportunities.

The country-level data reveal other anomalies that cannot be so easily reconciled with political conditions. For example, since 1986 (the baseline year for our survey), Uganda and Ghana have had similar levels of political stability, a similar type of political regime, and for that matter, similar and relatively high levels of economic growth (making them showcases for structural adjustment programs in the region). Yet, Uganda's rate of return in the 1986-1996 period is quite high (79%), while Ghana's rate (34%) falls well below average.

Interpreting this huge difference can only be speculative at this stage. One possibility is that, at the time that our study begins, Uganda had just concluded a horrific civil war with its economy in tatters and much of its professional class either dead or in exile. A commitment to re-build the country by the new regime, strongly supported by the international donor community, may have attracted home some exiles and created opportunities for newly trained professionals. Some indication of this international role is evident from the country level data. The vast majority of cases reported for Uganda received some type of funding assistance from international agencies for their Ph.D. training. By contrast, almost half of the reported Ghanian cases showed that students received primary funding from the North American institutions that conferred their degree. As we will discuss below, our data show

a strong correlation between non-university sources of funding and high rates of return (in no small part because of the formal requirements of most fellowship programs that grantees return upon receiving the degree). Finally, it is possible that the existence of a substantial Ghanian community in the United States (at least relative to Ugandans) contributes to higher stay rates for Ph.D. recipients from Ghana. A similar argument might be made for Nigerians. In other words, differential immigration patterns in the general population of particular nationalities may correlate with decisions to stay or return among Ph.D. recipients.

For South Africa, with 223 Ph.D.'s for the study period (second only to Nigeria) and a relatively high overall rate of return home of 67% (based on 115 known cases), annual data tempt one to point to a correlation between positive political change and increased return home. However, the usual caveats concerning the small number of reported cases apply here as they do elsewhere. Rates of return home for South African Ph.D.'s are above the survey average (57%) in all years except 1988 and 1996, and peak in 1991 (86%) and 1993 (75%) around the time of Nelson Mandela's release from prison and the achievement of black majority rule. However, only with a better longitudinal reading of South African data could one comment with confidence on suggested postapartheid-era improvements to historically high return rates in South Africa. In addition, our survey data do not allow us to consider the rate of return to South Africa according to citizens' race. Knowledge of whatever disparities exist would be useful for those sponsoring organizations whose policies may be geared specifically to support traditionally disadvantaged segments of the population in this country.[21]

One other variable that some analysts have identified as being consequential for return rates is language — i.e. whether the home country's official language is English, French, or Portuguese. While one study hypothesizes that language may play a role in influencing stay rates for Africans who come to the United States,[22] the survey data do not support this interpretation. Of the 1,110 Ph.D. recipients in the database for whom return status is known, 860 (77%) are from anglophone countries, 241 (22%) from francophone countries, and 9 (0.8%) from lusophone countries. Data presented in Table 4 for return status by official language category indicate no major difference between anglophone and non-anglophone Ph.D.'s. More anglophones than francophones do report staying in the U.S., but the difference is relatively small at 37% and 32% respectively; the rate for Portuguese

speakers, based on a very small number of cases, is 22%. It is unlikely that language acts as a possible deterrent to francophone and lusophone Africans wishing to stay in anglophone North America. It is perhaps an issue of greater concern to the general migrant population than for individuals who successfully complete doctoral training at universities where English is the medium of instruction.

TABLE 4: RETURN STATUS BY OFFICIAL LANGUAGE CATEGORY FOR ALL PH.D.'S IN SURVEY, 1986-1996

LANGUAGE CATEGORY	KNOWN RESIDENCE STATUS (N)	RETURN STATUS (%)			
		HOME	AFRICA	STAY	OTHER
ANGLOPHONE	860	57%	5%	37%	1%
FRANCOPHONE	241	57%	8%	32%	3%
LUSOPHONE	9	67%	0%	22%	11%

SOURCE: SSRC Rate of Return Survey, 1998.

Field of Study and Return

Data on the academic disciplines in which graduates received their degrees are presented in Tables 5 and 6. Since this information was reported at varying levels of academic specialization depending on the survey respondent, discipline was coded according to the "broad" (Table 5) and "general" (Table 6) field of study classifications used in the NSF Survey of Earned Doctorates.[23] For most broad discipline categories, the percentage distribution across fields in our sample corresponds very closely with the distribution for all African Ph.D.'s for the period. One exception is a slightly higher percentage of Life Science Ph.D.'s in our sample. Comparison of the survey sample and the overall population according to NSF data (in parentheses) is as follows: Education 18% (18.8%), Engineering 9% (10.3%), Humanities 9% (8.1%), Life Sciences 35% (27.2%), Physical Sciences/Mathematics 6% (9.3%), Social Sciences 16% (18.2%), and Professional/Other Fields 5% (8.1%).

TABLE 5: FIELD OF STUDY BY DEGREE YEAR FOR ALL PH.D.'S IN SURVEY, 1986-1996

FIELD OF STUDY	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	TOTAL
EDUCATION	22%	24%	19%	17%	20%	24%	18%	15%	16%	18%	14%	18%
ENGINEERING	9%	16%	9%	14%	9%	7%	5%	7%	8%	7%	10%	9%
HUMANITIES	15%	15%	11%	9%	8%	9%	11%	8%	6%	10%	8%	9%
LIFE SCIENCES	21%	21%	31%	31%	37%	29%	31%	37%	45%	46%	42%	35%
PHYSICAL SCIENCES	5%	4%	5%	4%	2%	10%	8%	10%	7%	5%	8%	6%
PROFESSIONAL FIELDS	7%	4%	4%	12%	6%	5%	4%	5%	4%	3%	4%	5%
SOCIAL SCIENCES	21%	17%	20%	14%	17%	14%	22%	19%	14%	11%	13%	16%
OTHER FIELDS	1%	0%	2%	1%	1%	1%	1%	0%	0%	0%	1%	1%

Note: See Appendix Table A-6 for description of field of study categories.
SOURCE: SSRC Rate of Return Survey, 1998.

Among the three most prominently represented broad fields in our survey — Life Sciences, Education, and Social Sciences — two show trends indicating significant changes in their percentage share of Ph.D.'s over time. Trends in the sample, however, are not always paralleled by similar changes for the overall population of African Ph.D.'s reported by the NSF. For example, in Education, the change in percentage share of Ph.D.'s in the sample (22% in 1986 to 14% in 1996) is matched fairly closely by a similar change in the population (24% in 1986 to 16% in 1996). In the Social Sciences, however, the change in percentage of Ph.D.'s in the sample (21% in 1986 to 13% in 1996) is quite different from the population (17% and 15%, respectively). The change in the proportion of Ph.D.'s granted in the Life Sciences is also quite different between the sample (21% in

1986 to 42% in 1996) and the population (26% and 30%, respectively). It is clear that Ph.D.'s awarded in the Life Sciences, and particularly the Agricultural Sciences, are over-represented in our survey data, especially in the later years.[24]

A picture of known return status by both broad and general field of study designation is presented in Table 6. All broad field categories except Engineering report a rate of return to home country of 50% or more; for engineering, the rate is 45%. The fields with return rates at or above the survey average of 57% are the Life Sciences at 63% (70% when Home and Africa locations are combined) and Education at 57% (62% Home + Africa), and Social Sciences at 57% (65% Home + Africa). Sixty-nine percent of graduates with degrees in the Agricultural Sciences (classified within the Life Sciences), who account for 22 percent of all Ph.D.'s with known return status, reside in their countries of origin. The highest Stay rates (combining the Stay + Other categories) are reported for graduates in Engineering (54%), the Humanities (46%), and the Physical Sciences (44%).[25]

In sum, we see high return rates among Ph.D.'s in those fields which have produced increasing numbers of Ph.D.'s in the period under study. This is especially the case for the Life Sciences and, within that broad category, the Agricultural Sciences. While Education has a relatively high return rate, the absolute numbers of Ph.D.'s in our survey have remained at virtually the same level from 1986 to 1996, and the percentage of Education Ph.D.'s has declined sharply.[26] The Social Sciences demonstrate a similar, if less pronounced pattern, with a slightly lower return rate. The Humanities, Physical Sciences, and especially Engineering have the lowest return rates. One might hypothesize that the high demand for highly trained professionals in North America in the latter two of these fields (Physical Sciences and Engineering) partly explains this outcome, while the low demand for Ph.D.'s in the Humanities in Africa partly accounts for its low return rate. The converse may help explain the high return rates for the Life Sciences (and, again, particularly Agriculture) and Education — i.e., a relatively low demand in North America and a relatively high demand in the region.[27] Without data on actual labor markets, this is, of course, speculative. However, as we discuss below, those fields with high return rates in our survey do loosely correlate with those fields prioritized by funding programs. Moreover, these programs frequently select for advanced training those Africans working on projects they are funding, and often hold open their jobs (or better ones) until their return. Thus, these results are not entirely surprising.

TABLE 6: RETURN STATUS BY FIELD OF STUDY FOR ALL PH.D. IN SURVEY, 1986-1996

FIELD OF STUDY	TOTAL PH.D.'S (N)	KNOWN RESIDENCE STATUS (N)	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
EDUCATION	308	188	61%	57%	5%	37%	1%
ENGINEERING	147	73	50%	45%	0%	49%	5%
HUMANITIES	159	109	69%	51%	3%	44%	2%
FOREIGN LANGUAGE/ LITERATURE	30	21	70%	38%	5%	52%	5%
HISTORY	34	24	71%	58%	0%	42%	0%
LETTERS	63	42	67%	62%	2%	33%	2%
OTHER HUMANITIES	32	22	69%	36%	5%	59%	0%
LIFE SCIENCES	587	376	64%	63%	7%	28%	2%
AGRICULTURAL SCIENCES	360	239	66%	69%	7%	23%	1%
BIOLOGICAL SCIENCES	138	69	50%	62%	4%	29%	4%
HEALTH SCIENCES	88	68	77%	44%	10%	44%	1%
PHYSICAL SCIENCES	109	82	75%	52%	4%	39%	5%
ATMOSPHERIC SCIENCES	4	4	100%	25%	25%	50%	0%
CHEMISTRY	34	23	68%	30%	9%	57%	4%
COMPUTER SCIENCES	9	6	67%	83%	0%	17%	0%
GEOLOGICAL SCIENCES	9	6	67%	33%	0%	33%	33%

Chart Continues on page 20

TABLE 6: RETURN STATUS BY FIELD OF STUDY FOR ALL PH.D. IN SURVEY, 1986-1996 (CONTINUED)

FIELD OF STUDY	TOTAL PH.D.'S (N)	KNOWN RESIDENCE STATUS (N)	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
PHYSICAL SCIENCES (CONT)							
MATHEMATICS	28	23	82%	61%	0%	39%	0%
PHYSICS	22	17	77%	65%	0%	29%	6%
OTHER PHYSICAL SCIENCES	3	3	100%	67%	33%	0%	0%
PROFESSIONAL SERVICES	85	52	61%	52%	2%	44%	2%
BUSINESS MANAGEMENT	25	18	72%	27%	0%	67%	6%
COMMUNICATION	19	9	47%	56%	0%	44%	0%
OTHER PROFESSIONAL FIELDS	41	25	61%	68%	4%	28%	0%
SOCIAL SCIENCES	274	196	72%	57%	8%	34%	1%
ANTHROPOLOGY	25	17	68%	70%	12%	18%	0%
ECONOMICS	62	47	76%	64%	2%	32%	2%
POLITICAL SCIENCE	51	38	75%	44%	3%	53%	0%
PSYCHOLOGY	15	9	60%	89%	0%	11%	0%
SOCIOLOGY	56	40	71%	55%	15%	28%	2%
OTHER SOCIAL SCIENCES	63	45	71%	49%	9%	42%	0%
OTHER FIELDS	9	6	67%	33%	0%	67%	0%

Notes: See Appendix Table A-6 for description of field of study categories. Field of study was reported for 1,678 (98%) of all survey cases; of these, return status was known for 1,082 cases, or 64%. SOURCE: SSRC Rate of Return Survey, 1998.

Demographic Variables and Return: Age and Gender

Age at graduation and gender profiles of African Ph.D.'s in the survey are presented in Table 7. The profile of doctorates in our sample corresponds almost exactly with that of the population of African Ph.D.'s for the period as reported in the NSF Survey of Earned Doctorates. The sample and population (in parentheses) age profiles are: 20-29 years, 7% (6%); 30-39 years, 62% (64.3%); 40-49 years, 29% (27.3%); and 50+ years, 2% (2.4%).

Tabulation of age at graduation by known return status reveals an interesting pattern in which the rate of return to home country increases with increasing age at graduation. For example, comparing the 20-29 year-old cohort with the 40-49 age group, we observe that the percentage of graduates residing in the country of origin rises from 36% to 58%. Conversely, among the same age cohorts, the Stay rates are 55% and 35% respectively. Consequently, age appears to be an important factor with respect to post-graduation location decisions. This may be the case because older Ph.D. recipients are more likely than younger ones to have established careers to return to in the home country once studies are completed, or perhaps because older Ph.D. recipients are more likely to have a spouse and children at home.[28]

Turning to the gender composition of African Ph.D.'s in our sample, our survey reveals an unsurprisingly high ratio of males to females. The data show that 19% of all degree recipients are female; the corresponding figure for the population of sub-Saharan African Ph.D.'s for the period is 15% as reported in the Survey of Earned Doctorates.[29] When crossed with field of study, survey data indicate that women in the sample are represented above the 19% mark in the following fields (comparative figures from NSF data for the population in parentheses): Education 27% (20%), Health Sciences 28% (25%), Professional Fields 26% (17%), and Biological Sciences 20% (20%). This conforms to expectations that women would be disproportionately represented in education and health, and under-represented in fields such as Agriculture (13% sample, 11% population), the Physical Sciences (10% and 9% respectively), and Engineering (6% and 3% respectively). In the Social Sciences, women account for 18% of degrees awarded in the sample and 13% in the population.

The data reveal no difference when gender is crossed with known return status. The rates at which both males and females return home (approximately 55%) or stay in North America (approximately 37%) mirror closely those for the overall sample.

TABLE 7: Return Status by Age and Gender for All Ph.D.'s in Survey, 1986-1996

AGE COHORT	KNOWN RESIDENCE STATUS (N)	RETURN STATUS (%)			
		HOME	AFRICA	STAY	OTHER
20-29 YEARS	55	36%	5%	55%	4%
30-39 YEARS	570	56%	5%	37%	2%
40-49 YEARS	278	58%	5%	35%	1%
50+ YEARS	18	56%	11%	33%	0%
GENDER					
MALE	897	57%	5%	35%	2%
FEMALE	213	54%	5%	39%	1%

SOURCE: SSRC Rate of Return Survey, 1998.

Degree Granting Institutions and Return

Table 8 summarizes rates of return by degree granting institution for the nineteen schools in our sample that report at least 30 Ph.D.'s. It is difficult to draw substantive conclusions as to what influence, if any, the degree granting institution attended has on rates of return. This is due in part to the relatively small number of Ph.D.'s from many of the 54 surveyed schools for whom we have any data regarding return. However, few clear trends stand out even among the universities with relatively large numbers of Ph.D.'s.

Among the nineteen institutions included in Table 8, only six – Michigan State, Ohio State, Florida, Kansas State, Stanford and Iowa - have return rates to home country or elsewhere in Africa that exceed the overall sample rate of 62%.[30] These schools, with the exception of Stanford, have strong programs in the agricultural sciences which may explain the higher rates of return.[31] Surprisingly, graduates from Wisconsin, also known for its strong agricultural program, show a relatively low rate of return to the continent (45%). However, Ph.D.'s in agricultural sciences at

TABLE 8: Return Status at Top Ph.D. Producing Universities, 1986-1996

UNIVERSITY	TOTAL PH.D.'S (N)	KNOWN RESIDENCE STATUS (N)	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
MICHIGAN STATE	135	77	57%	87%	1%	12%	
WISCONSIN	114	95	83%	38%	7%	51%	4%
OHIO STATE	113	9	8%	78%	11%	11%	
IOWA STATE	107	66	62%	44%	6%	44%	6%
INDIANA	77	75	97%	37%	4%	59%	
MINNESOTA	62	21	34%	33%	10%	57%	
PENN STATE	62	29	47%	21%	7%	72%	
FLORIDA	53	23	43%	61%	4%	35%	
KANSAS STATE	52	27	52%	70%	11%	15%	4%
ARIZONA	47	17	36%	59%		35%	6%
PENNSYLVANIA	46	44	96%	34%	7%	57%	2%
MASSACHUSETTS	45	39	87%	33%		64%	3%
UCLA	45	8	18%	50%		50%	
STANFORD	44	3	7%	33%	33%	33%	
QUEEN'S (CANADA)	42	35	83%		23%	66%	11%
FLORIDA STATE	41	33	80%	36%	6%	58%	
IOWA	37	16	43%	56%	13%	31%	
UC-BERKELEY	35	22	63%	54%	5%	36%	5%
COLUMBIA	30	9	30%	44%	12%	44%	

SOURCE: SSRC Rate of Return Survey, 1998.

Wisconsin account for only 12% of all graduates for whom return status is known, while the corresponding figures for Michigan State, Florida, and Kansas State are 40%, 33% and 52%, respectively.

Examination of the current country of residence for Ph.D.'s graduated from Canadian versus U.S. institutions suggests that the country in which the degree is obtained may be a factor influencing rates of return. Although based on a smaller number of cases for Canada, the data show a higher rate of return to country of origin for graduates from Canadian universities (67%) than from U.S. institutions (56%); adding the Africa location to the Home location, the combined rates for return to the continent are 70% and 61% for Canada and the U.S. respectively (see Table 9).

The lower stay rate for Canada (26% versus 37% for the U.S.) is somewhat surprising in light of Canada's reputation for having generally liberal immigration policies vis-a-vis those of the United States. However, many of the cases reported for Canada in our survey are somewhat skewed towards doctoral recipients who received scholarships awarded by the Canadian government. As mentioned below, this source of funding often stipulates that awardees return to Africa once they conclude their studies.

TABLE 9: RETURN STATUS FOR CANADIAN AND UNITED STATES UNIVERSITIES FOR ALL PH.D. IN SURVEY, 1986-1996

COUNTRY	TOTAL PH.D.'S	KNOWN RESIDENCE STATUS	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
CANADA	109	102	94%	67%	3%	26%	4%
UNITED STATES	1,599	1,008	63%	56%	5%	37%	2%

SOURCE: SSRC Rate of Return Survey, 1998.

Post Graduation Institutional Affiliation

In addition to collecting data on rate of return, the present study also inquired into the post graduation institutional affiliations of Ph.D. recipients, both for those who returned as well as those who stayed. We have such data for 47% of the doctorates included in our survey, but the level of detail of this information varies considerably. That is, for some individuals we have the names of the specific

organizations or firms where they are employed, while for others we only can identify generic employer categories (e.g. private sector firm, government agency, international organization). Data related to return status and institutional affiliation are reported in Table 10.

This qualification aside, the data in our study do reveal some patterns in the career opportunities for Africans earning Ph.D.'s in North America. Of all Ph.D.'s for whom affiliation status is known (n=541), 68% have a university as their principal employer.[32] Among these, 63% are based at universities in their home countries (59%) or elsewhere in Africa (4%), while 37% are based in the U.S. or Canada (35%) or elsewhere outside of Africa (2%). These rate of return figures are virtually the same as the overall rate found for the entire sample. One is tempted to read these as positive findings. In other words, despite the poor infrastructure conditions at most African universities, extremely low salary scales, and the frequent closures due to strikes and oppositional political activity on campus, a fairly high percentage of Ph.D.'s are working at institutions of higher education in the region.[33] On the other hand, since a "natural" professional avenue for Ph.D.'s is the academy, such figures may not be too surprising.

Among the top ten Ph.D. producing countries in our survey, five have rates that exceed the overall sample rate of 59% for university-affiliated graduates at institutions in their home country.[34] This could be the result of greater numbers of faculty positions available in these countries, which for the most part are the largest countries in the region in terms of population (and with larger and more numerous institutions of higher education). For most of these countries, return rates for those in university jobs correlate with the country's overall rate. However, for Nigeria, the country with the largest sample size in our survey and with one of the lowest overall return rates, the percentage of the those working at universities who are based in the region (31%) is even lower than the overall rate of return (37%).

While universities constitute two-thirds of the institutional affiliations of the known cases in our survey, there is a tremendous diversity among the remaining third — beyond government ministries and the private sector, there are national and international research organizations, international and local NGO's. To some degree, this confirms a trend that has been recently noted with respect to Africa — a pluralization of institutions producing knowledge outside the universities at both the national and regional level, including independent research centers, policy institutes, multilateral

TABLE 10 : RETURN STATUS BY POST-GRADUATION AFFILIATION FOR ALL PH.D. IN SURVEY, 1986-1996

INSTITUTIONAL AFFILIATION	TOTAL PH.D.'S (N)	KNOWN RESIDENCE STATUS (N)	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
GOVERNMENT AGENCY	73	72	99%	82%	3%	13%	3%
INTERNATIONAL ORGANIZATION	31	29	94%	41%	45%	10%	3%
UNITED NATIONS ORGANIZATIONS	12	12	100%	42%	50%		8%
WORLD BANK	3	2	67%	50%		50%	
INTERNATIONAL RESEARCH ORGANIZATION	13	13	100%	7%	62%	15%	15%
NATIONAL ORGANIZATION	16	16	100%	75%	6%	19%	
NATIONAL RESEARCH ORGANIZATION	49	49	100%	90%	4%	4%	2%
PRIVATE SECTOR	60	60	100%	37%	2%	53%	8%
UNIVERSITY	541	535	99%	59%	4%	35%	2%
OTHER	17	17	100%	29%		71%	

Note: Affiliation categories were based on an examination of the complete list of survey responses. Some designations were plainly evident in the response given (e.g., university, government agency, named private corporations and research centers), while others proved somewhat more difficult to categorize in a succinct manner. Distinctions were drawn between entities whose primary mandate could be determined to encompass either a national or international scope, and whether or not main mission was research oriented.
SOURCE: SSRC Rate of Return Survey, 1998.

organizations, and NGO's that rely on action-oriented research.[35] Our data give some credence to the notion that these types of organizations are providing numerous employment opportunities. Thirteen percent of graduates whose return status is known (n=107) are employed by these institutions,[36] significantly higher than either the governmental or private sector. Returnees, defined as Home plus elsewhere in Africa, are 87% of this grouped category.

Two additional observations can be made. First, among Africans working in research organizations (national and international), 89% are based in the region, and 73% in their home countries. A large number of these Ph.D.'s received their training in the agricultural sciences. Second, among Africans employed by international organizations — both research and non-research oriented — 81% are based in the region. Perhaps most striking is that, among this group, 62% (or 50% of the total) are working somewhere in Africa outside their home countries, mostly with various United Nations agencies, the African Development Bank, and several agricultural research centers. According to the author of a recent study on the training of Africans in the population sciences, "If one accepts that work in another country of the region is as useful a contribution as work in one's own country, there may be less of a brain drain of high-level population specialists in sub-Saharan African than some have thought."[37] This raises a non-trivial question regarding the "brain drain": do we view differently a Malawian Ph.D. working at UNICEF headquarters in New York from a Malawian Ph.D. working at a UNICEF field office in Zambia? We will return to these interpretive issues at the conclusion of the study.

A final issue is related to employment in the private sector (8% of known cases) when crossed with rate of return. Sixty-one percent of those engaged in private sector activity are based outside of Africa — the only major institutional affiliation category that exceeds a 50% stay rate (see Table 10). This, of course, is not an unexpected finding given the still nascent business sector in most countries in the region. This is especially the case in the areas of research and development. Indeed, when we look at the fields of study of those employed in the private sector, we find an interesting contrast. For those outside the region, those fields which are most closely related to private sector research and development constitute 76% of all private sector jobs.[38] Among those working in the private sector in Africa, only 39% of Ph.D.'s received their degree in these fields. One possible inference is that returning Africans are more likely to work in positions in the private sector outside the scope of their formal doctoral training, either because of pull factors (e.g. higher salary scales) or push factors (other opportunities are not available). The nature of our data cannot allow us to do more than speculate, but this inference makes sense in light of what is known more generally about employment opportunities in the region.

At the country level, numbers are too low to make any rigorous statistical claims. We do note that Kenya and Nigeria, two countries in the region often cited for their entrepreneurship, have extremely low percentages for private sector employment (below the overall 8%) and that, among Ph.D.'s from these countries, only three Kenyans are working in the private sector in the region. The percentage for Ghana is above 8%, but only one of the known cases (out of eight) is working in Ghana. South Africa, not surprisingly given its relatively highly developed business sector, conforms to expectations with the highest percentage of individuals working in the private sector and with a 50% rate of return.

To summarize, according to our survey a significant number of Africans who earn Ph.D.'s in North America are employed at universities. Among those who do not return to Africa, most find employment in universities or private sector firms in the U.S. and Canada. While a relatively small percentage work for international organizations, most of these are based in the region (although often not in their home countries). Any conclusions drawn from this discussion must be put in the context of the limitations of the present study. Given its nature, we cannot address specific dimensions of Ph.D. recipients' professional activities such as the nature of their day-to-day work or the professional networks (national, regional, and international) in which they are engaged. This information is crucial to a complete assessment of "brain drain" issues and the effectiveness of capacity building initiatives. Such an assessment would include questions about the degree to which graduates are using the skills obtained during their training in their professional lives, which can be loosely inferred but not fully known from the type of institution that employs them. It would also include questions concerning the degree to which those who do not return remain in a productive relationship with their home countries through their work and professional contacts. Further analysis that builds upon the present study could investigate these areas, but it must be added that the challenges of data collection are rather daunting.

Funding Support for Graduate Study

Tables 11 and 12 present available information with respect to the primary source of sponsorship for graduate study obtained by the African Ph.D.'s in our survey. Table 11 reports funding source by degree year and by major sponsoring programs for degrees awarded at U.S. and Canadian institutions. A more detailed breakdown of specific funding sources is presented in Table 12, indicating known return status by funding source for all Ph.D.'s in the survey at U.S. and Canadian institutions combined.

In our survey, we collected data on the primary source of funding for Ph.D. study. By "primary," we mean the source that provided tuition cost and living expenses over the duration of the training program.[39] The organizations that constitute primary funders for African Ph.D.'s are mostly U.S. and Canadian government agencies (although in the U.S. case, parts of these programs are administered

TABLE 11: GRADUATE PROGRAM FUNDING SOURCE BY DEGREE FOR ALL PH.D.'S IN SURVEY AT U.S. AND CANADIAN UNIVERSITIES, 1986-1996

FUNDING SOURCE AT U.S. UNIVERSITY	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	TOTAL
AFGRAD	36%	30%	15%	27%	19%	23%	24%	28%	22%	24%	27%	25%
FULLBRIGHT	18	19	23	17	15	28	16	14	8	6	10	15
HOME COUNTRY	11	16	19	10	9	3	10	8	6	6	5	8
JJ/WBGSP	0	0	0	0	0	1	1	3	5	6	2	2
PERSONAL FUNDS	18	9	6	8	4	4	6	1	7	5	2	6
PRIVATE FOUNDATION	0	2	0	2	8	3	3	2	2	7	1	3
UNIVERSITY SUPPORT	13	21	35	24	38	32	28	36	32	33	46	32
OTHER USAID	2	0	0	0	4	6	5	3	11	8	5	5
OTHER US GOV'T	0	2	2	5	2	0	0	2	2	2	0	2
OTHER	2	0	0	7	2	1	6	1	5	2	1	3

Chart Continues on page 30

TABLE 11: Graduate Program Funding Source by Degree for All Ph.D.'s in Survey at U.S. and Canadian Universities, 1986-1996 (cont.)

FUNDING SOURCE AT U.S. UNIVERSITY	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	TOTAL
CANADIAN COMMON-WEALTH									2		3	5
CIDA		1							2	1	3	7
IDRC	1	1		3	1	4	4	9	11	7	4	45
JJ/WBGSP							1	1				2
ONTARIO GOV'T										1		1
OTHER CANADA GOV'T AGENCY											1	1
UNIVERSITY SUPPORT			1								3	4

Note: Given the scanty information on funding for Canadian Ph.D.'s, these data are reported as raw numbers instead of percentages. See Table A-3
SOURCE: SSRC Rate of Return Survey, 1998.

by private non-profit organizations). In other cases, support is provided by a joint Japan-World Bank program, as well as U.S. private foundations. Table A-3 provides descriptions of these programs. Table 11 indicates that 52% of Africans who earned Ph.D.'s in the United States in our survey received primary support from one of these programs, while the remainder were primarily supported by their universities in North America (32%), their home government (8%), or personal funds (6%).[40]

As noted in Table 12, the primary source of support for graduate studies was reported for 886 (52%) of the cases included in the database; of these, current residence status is known for 742 cases (84% of those reporting funding source). For the majority of funding sources, rates of return to home country exceed the survey average 57% returned Home and 62% Home + Africa. Specific pro-

TABLE 12: Return Status by Funding Source for All Ph.D.'s in Survey, 1986-1996

FUNDING SOURCE	TOTAL PH.D.'S	KNOWN RESIDENCE STATUS	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
AFGRAD	205	196	96%	73%	7%	19%	1%
CANADIAN COMMONWEALTH	5	5	100%	100%			
CIDA	9	9	100%	89%		11%	
CRSP'S	4	4	100%	75%		25%	
FULLBRIGHT	132	100	76%	79%	2%	18%	1%
HOME COUNTRY GOVERNMENT	67	56	84%	68%	5%	25%	2%
IDRC	45	45	100%	91%	4%	4%	
JJ/WBGSP	19	15	79%	40%	13%	47%	
LOANS	5	2	40%			50%	50%
PERSONAL FUNDS	46	25	54%	24%	4%	72%	
PRIVATE FOUNDATIONS	21	20	95%	75%		25%	
UNITED NATIONS AGENCIES	8	8	100%	50%	13%	37%	
OTHER U.S. GOV'T AGENCIES	47	39	83%	82%	8%	8%	2%
UNIVERSITY SUPPORT	261	208	80%	40%	8%	50%	2%
OTHER	12	10	83%	50%	10%	40%	

Notes: See Appendix Table A-3 for description of funding sources. Funding source was reported for 886 (52%0 of all survey cases; of these, return status was known for 742 cases, or 84%.
SOURCE: SSRC Rate of Return Survey, 1998.

gram or general funding categories reporting rates of return to home country of less than the average include the Personal Funds and University Support categories, at 24% and 40% respectively, and JJ/WBGSP at 40%.[41]

The rate of return for Ph.D.'s according to different kinds of primary funding sources must be put in the context of overall funding levels and numbers of Ph.D.'s produced. A recent study on international students in Canada noted that funding has declined significantly since the early 1990's.[42] While we have not been able to uncover precise funding trajectories for African Ph.D.'s by U.S. government agencies, we note that the shift by USAID from the AFGRAD to the ATLAS program may have resulted in an increase in the relative support of M.A.'s and a decrease in Ph.D.'s.[43] It has not been possible to obtain aggregate data for the U.S.I.A. Fulbright Program, and those surveys which were returned to us by individual country offices show no observable pattern in terms of the number of fellows supported over time.[44] However, one revealing statistic from our survey is that the percentage of Ph.D.'s supported by AFGRAD/ATLAS and Fulbright decreased from a total of 54% in 1986 to 37% in 1996, while university support increased from 13% to 46% in the same period (see Table 11).[45] Thus, while we cannot report conclusively on a decline in funding in the U.S. (as we are able to do with regard to Canada), it may still be helpful to place the discussion of return rates below in the context of absolute funding levels.

A more detailed examination of the data allows some assessment of the information about the relationships between source of funding for graduate study, post graduation employment, and the corresponding rates of return. As shown in Table 11, three major sources of funding support nearly three-quarters of all African Ph.D.'s. awarded in the United States — the African American Institute-administered AFGRAD/ATLAS Program (25%), the Fulbright Scholarships (15%), and universities through awards of teaching and research fellowships and assistantships (32%). University support for Africans is thus considerably lower than statistics collected by the NSF on all foreign Science and Engineering Ph.D. recipients in 1996, where 75% listed University Support as their primary source of funding.[46] Comparing this to the 32% university support figure from our survey for the 11-year period (and even the 1996 rate of 46%) indicates the extent to which the advanced training of Africans is dependent on direct donor intervention relative to Ph.D.'s trained in the U.S. from other world regions. One might speculate that this is due to the disparity between the types of fields that universities tend to richly support (basic research in the natural sciences) and the types of fields that Africans choose or that are seen as most relevant to the region (applied sciences, health, education).

With regard to return rates of those grantees who complete their programs, 73% of AFGRAD/ATLAS awardees and 79% of Fulbrighters return home, compared with 19% and 18% respectively who stay; for those who receive their primary support through university resources, the corresponding rates are 40% home country return and 50% stay (see Table 12).[47] A couple of factors may explain the higher rates of return observed among AFGRAD/ATLAS and Fulbright awardees. First, awardees of these government-sponsored programs are usually admitted to the United States on temporary non-immigrant visas. Terms of the award, immigration policy, and other official conditionalities associated with these sources of funding may help to explain their high rates of return. In addition, individuals who obtain these awards are usually well established professionals in their home countries, which seems to connect to our earlier finding that links higher return rates to older Ph.D.'s. AFGRAD/ATLAS awardees are often associated with a government agency or project that is supported by official U.S. development assistance. Many grantees of the Foreign Fulbright Graduate Student Program hail from the ranks of junior faculty at African universities. Consequently, these individuals may already have reasonably attractive positions to return to after completion of their graduate work (as long as conditions at home do not take a negative turn during the course of study). Indeed, most risk losing their jobs if they do not return after having been granted a leave of absence for graduate study.

As mentioned above, Africans who receive financial assistance directly through university resources tend to have higher Stay rates (50%) than either AFGRAD/ATLAS or Fulbright awardees.[48] Country-level data from our survey corroborate these aggregate findings. Among the top ten countries in terms of total Ph.D.'s, the three with the lowest return rates (Cameroon, Nigeria, and Ghana) are three of the top four in percentages of university support as opposed to direct donor sources of funding.[49]

Several inferences might be drawn from this pattern. Of course, the fact that university funding contains no requirements or informal pressures to return undoubtedly influence return rates when compared to donor funding. In addition, it is possible that a proportionately higher percentage of Ph.D.'s in this category earned their undergraduate degrees in the U.S., and are thus more knowl-

edgeable of the system and more competitive for university fellowships. A recent study of Africans with advanced degrees in the U.S. argues that there is a correlation between length of time spent in the U.S. (in some cases through having done undergraduate training here) and decisions to stay.[50] Also, one might infer that the experience gained and networks developed while holding teaching and research assistantships enhances prospects for employment in postsecondary education in the U.S. after graduation. Finally, as mentioned above, the fields for which university support is most readily obtainable may be those for which there is little employment opportunity in the Africa region.

Circumstances similar to those mentioned above for the AFGRAD/ATLAS and Fulbright programs help to explain the high rates of return for Ph.D. recipients who received funding from the Canadian-based International Development Research Centre (IDRC) as well as other programs sponsored by the Canadian government. As noted in Table 12, individuals who received funding from the IDRC show a 91% rate of return to home country. Although the number of cases is smaller, recipients of awards from the Canadian International Development Agency (CIDA) also show a high rate of return at 89%. In these instances, the high rates of return are likely related to the fact that awardees are selected from among staff members attached to U.S.- or Canadian-sponsored development projects, and who are expected to return to post after completing their training in North America.[51]

Thus, the relatively high return rates among the fellows of the U.S. and Canadian government-funded programs are the result of both the terms and conditions of the fellowships and the fact that most recipients are, due to their career status, more likely to return at the time of their selection. Staff at the African-American Institute, which implements the AFGRAD/ATLAS program, mentioned to us that when their fellows do not return, it is typically due to "push" factors (such as a political crisis in their home countries) rather than "pull" factors (such as a desire to reside indefinitely in the U.S.).

What Return Rates Do Not Tell Us

The data in our study — a reported overall rate of return to country of origin of 57% (62% if we combine Home and Africa destinations) — provide an essential starting point for understanding the multiple and complex factors that shape the actual post-graduation career patterns of sub-Saharan African Ph.D.'s trained in North America. However, the focus on return rates addresses only certain aspects of the "brain drain." Is a return to the continent of nearly two-thirds of Ph.D. recipients in our survey a sign of successful program interventions, or is it a signal that support for doctoral-level training at non-African universities may not be an efficacious way to build human capacity in Africa? Whatever the accuracy of our findings, they do not provide criteria for measuring success in this context.

Here we need to keep in mind that for all players involved in providing advanced training for Africans, return is a means to the end of home country development and human capital formation. In other words, we must be open to the possibility that those who have not returned may still be contributing to these goals, while the contributions of those who have returned may be limited depending upon the career path they actually pursue; the nature of their everyday work; and the broader political, economic, and institutional conditions under which they work.

The time frame within which to measure success is critical here, as the potential contribution that individuals can make will shift when the changes take place in their home countries — when a business person has easier access to credit, a scientist can receive support for research and access to laboratory equipment, an educator can subsist from her salary and face no threats to personal security from state harassment. In the absence of such a context, returnees may be inevitably "underemployed" — i.e., in order to make ends meet, they may have little choice but to engage in income-generating activities that may lie outside the realm of what they have been trained to do. They may even choose an entirely different career path (for example, a Ph.D. in political science may become a full-time commodities exporter). In this case, she may be contributing value to her country's development (perhaps using the credentials, if not the skills of the Ph.D.) while at the same time constituting an "internal" brain drain from the higher education sector to the business sector.

More broadly, we know that current conditions in much of sub-Saharan Africa encourage diversifying sources of income and networks of social support. This results both in simultaneously holding

several jobs in different sectors, as well as mobility across sectors. A university professor may move from the academy to a government position to managerial position in a private firm, all within a short span of years.

Most pertinent to our concern with return rates, this mobility can also cut across countries and regions. For example, in an anecdotal piece of information obtained from a former Ph.D. advisor, we learned about a female doctoral recipient who, after teaching for several years at a university in Kenya, ultimately returned to the U.S. A combination of job dissatisfaction in Kenya and long separations from a U.S.-based spouse, who earns more as a fast-food franchise manager than do most Kenyan professors, resulted in a decision to leave Africa and resettle in the U.S. More generally, an African Ph.D. may be forced into exile when the political winds change, or attracted to a job outside the region by an international organization offering a salary that dwarfs what her home institution can afford. In the latter case, this move may not signal a long-term commitment to stay outside one's home country, but a short– or medium–term strategy to accumulate enough resources and contacts that would make the subsequent return more viable and secure.

Even among those Ph.D.'s who have not (yet) returned, or who return only to leave again, their situation cannot be coded, at least a *priori*, as a defeat for development and capacity-building in their home countries. Some members of diaspora communities send remittances to their families and invest in enterprises in their home countries. Their in-depth knowledge of their homelands makes them likely candidates for staff positions and consultancies with international firms and non-profit organizations that operate in Africa. Those employed at North American universities may conduct collaborative research with locally based colleagues, find ways to provide educational opportunities for new generations of students (some of whom will return home), or participate in professional associations based in the region.[52] Of course, some percentage of this group will eventually return. For this subset, the years of work experience abroad bring added knowledge and a range of professional contacts. In such cases, it would be difficult to characterize those years spent away as "lost" to the home country. More generally, the value added to human capital need not end with the period of formal training, but can continue into the subsequent period of professional life. Thus, we must be cognizant of the possibility that "return" does not, by definition, accomplish the goals of capacity-building programs, while "stay" does not, by definition, vitiate the possibility of contributing to at

least some of those goals.

As was mentioned earlier, return rates must also be seen in the context of overall numbers of Africans receiving Ph.D.'s. While we have no systematic data, there are some indications that overall funding levels may be decreasing, or that support is being shifted from the production of Ph.D.'s to other kinds of capacity building initiatives.[53] As we know from the AFGRAD/ATLAS program — a major program providing primary support for graduate training for Africans in the U.S., there has been a de-emphasis on Ph.D.'s and a focus on masters' level training since the mid-1990's. The Population Council reports that the level of support for African Ph.D.'s in the population sciences has decreased and funding commitments have been shortened from multi-year support to one- or two-year grants.[54] A similar trend is apparent for the Foreign Fulbright Graduate Program — since the mid-1990's, it has prioritized supporting greater number of students to fulfill the goals of cross-cultural understanding rather than funding fewer students for longer programs. Thus, donors might consider whether the bigger "problem" is an insufficient rate of return or the absolute number of Africans receiving Ph.D.'s, and whether the fields in which Africans receive training are in sync with both local needs and local labor markets.

CONCLUSION & RECOMMENDATIONS

Relevance of Findings for University, Sponsor, and Home Country Communities

While mindful of these qualifications, and the caveats concerning the sample data presented in this report, we would suggest that, at least numerically speaking, a nearly two-thirds return rate revealed in our study represents a net gain for the countries whose citizens go abroad for advanced training and education. The results also run counter to assumptions that "most" Africans who earn Ph.D.'s in North America remain here after graduation. As a first of its kind, this study begins to fill the gap in our knowledge of the professional geography of African Ph.D. recipients trained in North America. With the exception of a small number of sponsorship organizations that endeavor to keep in touch with their former awardees, little is known about what happens to African Ph.D.'s once they leave the institutions where they were trained. The database we have constructed during the course of this study helps to remedy this lack of information. Furthermore, we have presented data based on actual rather than intended postgraduation career paths. This added dimension allows comparison of actual outcomes with stated intentions as reported elsewhere.

The results of this study provide information to a number of parties interested in assessing program interventions designed to enhance human capacity in Africa. These results can assist program designers in asking the right questions, rather than providing hard answers. Among the possible lessons to draw from this study, we offer the following:

1) One solid finding from our study is that older Ph.D. recipients have higher return rates than younger ones. In light of this, donors may ask whether they should target older students in their fellowship programs or design programs specifically for younger ones. The latter may be a riskier strategy but, if successful, would increase return rates among a cohort who are otherwise less likely to return to their home countries.

2) Our study also found large differences in return rates between countries. Again, donors may ask whether they should "pick winners" — i.e. students from countries that have high return rates or, alternatively, try to improve the return rates for countries where relatively high percentages of students tend to stay in North America. One caveat here is that political and economic conditions in specific countries can change quickly. A "winner" today may not offer the kinds of macro-conditions tomorrow that will encourage return. Among countries with relatively large numbers of Ph.D.'s in our survey, Ghana and Cameroon stand out as having low return rates without demonstrably different macro-conditions from those countries with high rates. A deeper understanding of this phenomena would be useful when thinking about how support programs can make a difference in return rates when the decision to return home is not overdetermined by macro-factors.

3) Our data show that some U.S. institutions, and especially the Title VI centers, have demonstrably higher return rates among those Africans they have trained than others. Support programs might consider whether concentrating their fellows at these institutions would produce higher overall return rates. A recent Population Council report on Africans trained in the population studies outside the continent, while not focusing on issues of return rates per se, suggests that African students may be spread over too many institutions, thus minimizing possible synergies of having groups of students concentrated at a smaller set of key universities.[55] Donors could inquire whether a similar logic obtains regarding return rates across fields and disciplines.

4) Two points can be raised with regard to the disciplines in which African Ph.D.'s receive training in North America. First, our survey documented a significant decline over time in the percentage of Ph.D.'s awarded in Education, a less marked decline in the Social Sciences, and an sharp increase in the Life Sciences, including Agriculture. As several of the major support programs target the Life Sciences and Agriculture, this may be a desired outcome, although one might ask if the scales are now tipping too far. Second, the highest return rates are in the Life Sciences, especially Agriculture, as well as Education and the Social Sciences (despite the decline in the percentage of Ph.D.'s trained in these fields). Donors and African institutions need to debate which fields constitute the biggest priorities and how closely the production of Ph.D.'s approximates the numbers needed in the

region. (The numbers for which there are job opportunities is a separate issue). Again, betting on winners — i.e., the Life Sciences — which have high return rates may result in the neglect of other important fields whose declining numbers may be a function not only of lower return rates but also of lower absolute levels of support.

5) With regard to the institutions that employ Africans after graduation, our study reveals two pertinent findings. First, universities, both in the region and outside, provide a high percentage of employment for Ph.D. recipients. Second, Africans working in international organizations and non-university research institutions are doing so mostly in the region. Questions for donors to ponder are: is the predominance of university employment in the region a positive or negative outcome? Given the high percentage of persons employed at universities, should donors concentrate investments in strengthening African universities? Or, given the high return rates associated with international organizations and research institutions, should donors concentrate investments in building up these organizations in the hopes of encouraging greater rates of return? If the latter, how would this affect university faculties? Self-conscious thought directed to the effect on incentive structures of donor interventions in labor markets for African professionals is necessary if higher rates of return are not to come at the expense of institutions of higher education in the region.

Taking into account the options presented to, and constraints confronted by, a newly minted African Ph.D., we hope that our findings will stimulate thoughtful discussion about what to continue, and what to change, in deciding funding levels and designing new education and training initiatives. Given that resources for manpower training are limited in most of Africa, it is especially important to design programs that maximize chances for meeting goals and objectives. Where the goal is to provide advanced academic training to individuals who can make important contributions to education, business, public administration, health services, and other sectors of society, it is useful to have mechanisms in place that begin to measure the degree to which the goal has been attained. We hope that this study, by initiating a process for tracking the career trajectories of Africans who have earned Ph.D.'s in North America, provides one such mechanism.

Considerations for Future Study

In contemplating avenues for further investigation, we offer several suggestions for building on the work already undertaken. First, more could be done to attempt to collect additional data and/or to strengthen the quality of the data already collected. For instance, since many universities and other collaborators were unable to respond to our survey by the time we initiated data analysis, due to lack of time and/or resources, we might consider whether it is possible to obtain further data on a fee-for-service basis.

Second, as we learned while conducting our investigation, faculty advisors are often strong sources of accurate, up-to-date information on the current professional lives of their former African advisees. The effort we devoted to identifying and tracking down dissertation advisers was very labor intensive, but the results allowed us to place considerable confidence in the information they provided. This approach, however, is predicated on having the names of doctoral recipients from which to begin the advisor search. However, there are many confidentiality-related obstacles to obtaining such information, even when the organization conducting the research can be reasonably expected to adhere to professional standards.

Finally, in light of the caution we had to take in interpreting the information acquired on current whereabouts, one might consider a study designed to contact directly a smaller sample of African Ph.D. recipients with the goal of mapping their post graduation movements over time. This could be accomplished by obtaining a certain number of recent curriculum vitae from African Ph.D.'s graduated over a given time period. Such a longitudinal study would allow us to better understand true trajectories, rather than relying solely on data about current residence for which we have few precise time references.

ENDNOTES

[1] Three studies we have consulted as background to the present report are Bernard Logan, "The Reverse Transfer of Technology from Sub-Saharan Africa to the United States," The Journal of Modern African Studies, 25, 4 (1987), Kofi Apraku, African Émigrés in the United States: A Missing Link in Africa's Social and Economic Development, New York: Praeger (1991), and Michael Slawon, "The Factors Influencing Non-Return of African Graduate Students in the United States: The Study of Reverse Transfer of Human Capital," Ed.D. dissertation, North Carolina State University (1998). In addition, several recent reports have been produced by the National Science Foundation on the return of foreign students to their home countries after Ph.D. training in the United States, but they do not include Africans. We refer to these reports in subsequent sections to provide some comparative data. However, both the NSF studies and the Africa-specific studies of Apraku and Slawon rely on stated intentions rather than actual return data.

[2] A list of the countries included in the study is found in the appendix (see Table A-1).

[3] This amounts to an average of 441 African Ph.D.'s per year over the 11 year period. There has been an upward trend since the late 1980's. In 1989, the number of African Ph.D.'s was 380, while by 1994 it had risen to 542, a figure significantly higher than any other year. The numbers for 1995 and 1996 are 451 and 457, respectively. The Survey of Earned Doctorates (SED) is conducted annually by the National Research Council's Office of Scientific and Engineering Personnel. Subsequent references to SED data for African Ph.D. recipients mentioned in this report relate to customized tabulations obtained from the National Opinion Research Center at the University of Chicago, the main contractor responsible for the dissemination of SED data to interested researchers.

[4] This amounts to an average of 62 African Ph.D.'s per year over the 11 year period. There has been a steady increase beginning in the early 1990's. In 1991, the total was 41, while by 1994 it had reached 94 (with a drop to 76 in 1995, and then 88 in 1996). These figures are extrapolated from data provided by Statistics Canada.

[5] Attempts to obtain a licensing agreement that would have allowed us to work in-house with the SED database were rejected based on Federal non-disclosure protocols.

[6] Although an obvious constant for the overwhelming majority of the study population, an attempt was nonetheless made to collect data on graduates' race. This was done with an eye toward analyzing how this factor might influence rates of return in countries with sizeable European settler descended populations (e.g., Namibia, South Africa and Zimbabwe). However, information on race was omitted in almost all returned surveys and is therefore not included in our analysis.

[7] On occasion, certain of our collaborators, at their discretion, provided us with the names of individual Ph.D. recipients. For these cases, an effort was made to identify and contact former dissertation advisers to solicit information on their students' current occupations and whereabouts. Many of those who responded were able to provide accurate, up-to-date information.

[8] In Apraku's study (African Émigrés), among Africans residing in the United States who responded to his questionnaire, those who said they intended to remain in the U.S. cited as significant such factors as the desire to raise children in the U.S., an American spouse, and personal freedoms and civil liberties. For those who stated their intention to return to Africa within five years, investments in Africa, lack of job satisfaction in America, and family ties in Africa were significant considerations. In addition, reasons having to do with patriotism and improving economic and political conditions may also serve as motivating factors for return to Africa in some instances.

[9] That 35% of cases are unknown is not insignificant. It is difficult to determine to what degree the return rates of unknown cases approximate the rates of known cases. Thus, there may be some selection bias built in to our analysis, but the extent to which it might affect our findings is hard to measure. For these ratios, "return" incorporates Ph.D.'s who are located either in the home country or elsewhere in Africa.

[10] For these ratios, "return" incorporates Ph.D.'s who are located in the home country or elsewhere in Africa.

[11] Some corroboration of this pattern is offered in a recent NSF study on the intentions of Science and Engineering Ph.D. recipients from selected countries in Europe and Asia, as well as Canada and Mexico, for the period 1988-1996. Among those graduates who reported firm job offers in the U.S. at the time of graduation, over half claimed they were planning to take postdoctoral appointments. The study does not attempt to report on employment after a postdoctoral position has ended; as mentioned, the SED surveys intentions at the time of graduation only. See National Science Foundation, Division of Science Resource Studies, Statistical Profiles of Foreign Doctoral Recipients in Science and Engineering: Plans to Stay in the United States, NSF 99-304, Author: Jean M. Johnson, Arlington, VA (November 1998).

[12] The Survey of Earned Doctorates reports intention to return based on two separate counts: one for those with "firm intentions" (indicating, for example, a firm offer of employment at the time they completed the survey), and a second for those whose intentions are "not firm" (indicating that at the time they completed the survey respondents were either negotiating or seeking a position, but that no definite plans could be confirmed). The figures reported here are based on a combined overall count of both firm and non-firm intentions. It is worth noting, however, the significant difference reported between those whose intentions were "firm" (49% stay/50% return) versus those whose were "not firm" (79% stay/20% return).

[13] Science and engineering does not include the fields of Education and the Humanities. The Oak Ridge study included all of North Africa other than Egypt in their calculations for Africa (and for some reason included Egypt in their Africa figures for the Social Sciences). It is restricted to persons who held temporary visas at the time of graduation. Interestingly, this study finds that stay rates for all foreign students increase slightly over time for a given year of graduation. See Michael G. Finn, "Stay Rates of Foreign Doctorate Recipients from U.S. Universities, 1995," Oak Ridge,TN: Oak Ridge Institute for Science and Education (1997).

[14] Of course, the distribution of opportunities to pursue advanced degrees abroad within countries is itself a political issue, especially with regard to ethnic identity, and one to which our data cannot speak. But it may be an issue to which capacity building programs might be more sensitive, at least in this sense of asking whether disproportionate numbers of grantees come from particular regions or ethnic groups (which may exacerbate ethnic tensions). Nor, it should be added, can we provide information on the socio-economic origins of those Africans who pursue Ph.D.'s abroad. It is a reasonable presumption that a large proportion of advanced graduate students come from relatively privileged backgrounds, as they do elsewhere. (By "relatively privileged," we do not mean that their graduate studies are self-funded [only 6% in our survey] but that even being in a position to qualify for advanced degree programs in North America often [although not always] presupposes access to very rare opportunities in most African countries.) Thus, other questions that support programs might ask are whether their grantees have access to other resources in covering the costs of advanced graduate study, and whether the programs see, as a self-conscious goal, providing special consideration for students from disadvantaged socio-economic backgrounds.

[15] As noted in the following pages, much of our analysis concentrates on the ten countries in our sample with the highest Ph.D. production. These are: Nigeria (261), South Africa (223), Ghana (166), Kenya (155), Sudan (92), Ethiopia (89), Cameroon (62), Tanzania (58), Uganda (54), and Zimbabwe (51). Compared with data from the NSF, the proportions of Ph.D.'s for these 10 countries in our sample is within 3 percentage points of the population in all cases except Nigeria (NSF data show Nigerians account for 30% of all Ph.D.'s in the United States; in our survey they account for only 15% of all cases). This may be significant because of the high number of Nigerian Ph.D.'s and the low return rate for Nigeria in our survey. A more representative sample of Nigerians might indeed lower the overall return rate in our study. Summary information for rate of return by country of citizenship is given in Table A-5.

[16] See Table A-5. For the remaining country, Guinea-Bissau, the one Ph.D. (of a total of 4) for whom return status is available is reported to reside outside both the Africa and North America regions.

[17] For example, knowing the return status of 86% of Gambian Ph.D.'s in our survey accounts for a total of only 6 individuals; for Nigeria, knowledge of the status of only 50% of all Ph.D.'s represents 131 individual cases.

[18] With the partial exception of Cameroon, francophone countries are conspicuously absent from this top ten list. This is partly explained by the absence of data in the survey from francophone Canadian universities. However, it should be noted that 1) other than Congo/Zaire, most francophone African nations have lower populations than those on the list, and 2) due to linguistic imperatives, it is likely that a high percentage of francophone Africans receive advanced training in France and Belgium, thus lowering the percentages of potential Ph.D.'s from francophone countries in North American institutions. 111

[19] It should be noted that stability and regime type do not necessarily correlate – i.e. some authoritarian regimes may be relatively stable, while more open democratic regimes may be relatively unstable. Thus, regime type is a less convincing predictor of return than stability, and other intervening variables such as professional opportunities and institutional conditions are likely to be of greater consequence. One hypothesis which would be interesting to test is whether the existence of certain liberal rights such as freedom of speech and freedom of assembly constitute salient conditions for return, as one might expect with regard to highly trained intellectuals. Our study does not contain data that would speak to such a hypothesis. In-depth interviews with Ph.D.'s from both the Return and Stay categories (which was outside the scope of this study) might be most revealing on this question.

[20] Due to the relatively few cases for which the data are reported, it is difficult to gauge the degree to which political events in Nigeria over the period of study have influenced observed rates of return. Acknowledging that the number of cases for which return status is known fluctuates widely over the study period, one does note that the rate of return home among Nigerians is below 35% during the early 1990's, reaching a nadir of 15% for Ph.D.'s granted in 1994, the year the Abacha regime came to power.

[21] It would be interesting to see if the stay rates of black South Africans has decreased, and if stay rates of white South Africans increased, since the early 1990's.

[22] Logan, "The Reverse Transfer."

[23] "Broad" and "General" categories as used in the NSF Survey of Earned Doctorates are described in Table A-6.

[24] Whereas in our sample the number of Ph.D.'s in the Agricultural Sciences in 1996 (n=43) is four times what it was in 1986 (n=11), population data show a more modest increase of only 13% over the period (56 degrees conferred in 1986 to 63 in 1996).

[25] The Oak Ridge Institute Study alluded to earlier (which did not include the fields of Education and the Humanities) also showed Engineering to have the lowest return rate (49% in 1995) for Africans who received Ph.D.'s at U.S. universities in 1990-91. The return rate for Life Sciences was measured at 60%, Physical Sciences at 52%, and the Social Sciences at 61%. See Finn, "Stay Rates."

[26] One might read this as an expected response to the decline in salaries and status for those in the education field in the region. It may also indicate a shift by donors away from supporting advanced training in Education in the region, although we have no evidence to support this.

[27] Jane Guyer, who read an earlier draft of this report, noted that most Africans studying in the agricultural sciences in North America focus on tropical agriculture, making their training less relevant to positions inthe U.S. or Canada.

[28] Conversely, younger Ph.D. recipients may be more likely to find a spouse in their country of study.

[29] Similar low percentages for women were found in the surveys conducted by Apraku, African Émigrés, (1991) and Slawon, "The Factors."

[30] It is important to note that for two of the six schools, Ohio State and Stanford, the percentage of Ph.D.'s for which return status is known is very small (9 of 113 (8%) and 3 of 44 (7%) respectively).

[31]Recall the high rate of return to the continent (Home + Africa = 76%) for all Ph.D.'s in the sample who received their degree in agriculture (see Table 6).

[32] We say "principal" employer here because it is well known that many Africa-based academics supplement their incomes with consultancy contracts with government, the private sector, and international agencies. Our data cannot speak to these secondary sources of income.

[33] Of course, we cannot speak to the degree to which they are productively engaged in research and teaching, which will vary according to the individual and the institutional context.

[34] The five countries are: Kenya (67%), South Africa (65%), Tanzania (86%), Uganda (86%), and Zimbabwe (80%). Figures for other countries are: Cameroon (15%), Ethiopia (54%), Ghana (41%), Nigeria (30%), and Sudan (44%).

[35] See Kenneth Prewitt (ed.), Networks in International Capacity Building: Cases from Sub-Saharan Africa, SSRC Working Paper Series on Building Intellectual Capital for the 21st Century, Volume 2, New York: Social Science Research Council (1998).

[36] This combines our categories of international organization, international research organization, national organization, and national research organization (Table 10).

[37] Donald Heisel, Ph.D. Training for Africans in Population Studies, New York: The Population Council (1998), 5. The study also reports reduced funding at the Ph.D. level for the population sciences in recent years.

[38] This figure includes the fields of the natural sciences, engineering, computer science, mathematics, the geological sciences, and economics, for which we hypothesize that demand will be high outside the region for private sector research and development. Those fields not included are the health sciences, the agricultural sciences, the social sciences, the humanities, and education.

[39] In this study, a distinction is drawn between the source of sponsorship applied to tuition and living expenses during the coursework period, i.e. the "primary"funding, and any other sources of funding, such as field research awards, that students may obtain during their graduate programs. Since tuition and living expenses usually comprise the lion's share of graduate costs, and field research requirements often vary from student to student, we decided to limit our analysis of financing a doctoral program to the coursework period.

[40] Our survey shows an extremely high percentage of Ph.D.'s being supported by the Canadian governmental programs (Table 11). However, our sample is extremely biased in this particular case since the Canadian programs themselves (and especially the IDRC) were among the major providers of data for the survey.

[41] For the Japan-World Bank program, it should be noted that a recent in-house study reported a 67% home country return for all Africans program fellows for the years 1987-1992. The Bank's data is for Africans trained at institutions around the world, not only in North America, and does not differentiate between M.A. and Ph.D. levels. Whether the difference with our survey indicates a decrease in return rates since 1992 or a sampling bias on our part is unclear. See the Joint Japan/World Bank Graduate Scholarship Program (JJ/WBGSP), Tracer Study III, November 1997, Table 2-2A.

[42] As reported in Christine Jamieson, "Scholarship Provision in Canada for International Student Mobility," in The National Report on International Students in Canada 1996/97, Ottawa: Canadian Bureau for International Education (1997) 55-66. Jamieson reports a "steady decline" in Official Development Assistance devoted to foreign student scholarships at all levels of higher education. In addition, she reports a decline in the number of Ph.D.'s supported by the IDRC from 229 in the period 1986-1990 to 189 in the period 1991-1996 (this is for students from all world regions, including Africa).

[43] See Table 11. Although the absolute number of AFRGRAD/ATLAS PhD. fellows in our survey shows an increase from 16 to 26 over the 11–year study period (perhaps due to the number of Ph.D.'s already in the pipeline when programmatic priorities shifted), the percentage of all cases funded by AFGRAD declined from 36% to 27%.

[44] It is too early to tell what effect the recent merging of AID and USIA into the Department of State will have on these programs.

[45] The number of known cases for funding for all U.S. Ph.D.'s is 45 in 1986 and 97 in 1996.

[46] The categories of Science and Engineering include Psychology and the Social Sciences, but exclude Education and the Humanities. National Science Foundation, Directorate for Social, Behavioral and Economic Sciences Issue Brief, "International Mobility of Scientists and Engineers to the United States - Brain Drain or Brain Circulation?," NSF 98-316, Authors: Jean M. Johnson and Mark C. Regrets, Arlington, VA (revised version dated November 10, 1998). As the authors of this study point out, the category of university funding typically includes externally provided research grants made to universities and/or individual faculty members. For those who list university funding as a primary source, "the majority reported that their primary support came in the form of research assistantships. Financial resources for research assistantships are provided to universities by Federal Government agencies, industry, and other non-Federal sources in the form of research grants." In this sense, university support is somewhat of a catchall category since in some cases the funds may ultimately derive from donor organizations.

[47] It is important to keep in mind that this study only addresses those African students who have completed the Ph.D. program. Thus, we cannot address the return rate for all program awardees, some of whom may not finish their programs. The attrition rate itself may be affected, in some cases, by the design of specific support initiatives.

[48] Those who support their training through personal funds have an even lower return rate in our survey (24%), although they constitute only 3% of known cases. See Table 12.

[49] Kenya is the one exception here, with a relatively high return rate (70%, Home + Africa) but a 45% university support figure.

[50] Slawon, "The Factors."

[51] Literature we have reviewed from the Kellogg Foundation indicate a similar pattern of support for individuals associated with their ongoing field programs or who are likely to lead new programs after their training. Unfortunately, there are too few Ph.D. recipients in our sample reporting Kellogg as their primary funding source and thus we cannot report on their return rate, although their staff has estimated for us that it is over 90%. See Table A-3.

[52] Some often become active in diaspora groups promoting political change back in their homelands. Whether or not this contributes to their countries' development obviously depends on one's assessment of the political situation in the home country and of the motives of the individual.

[53] This is a view shared by many in U.S. training institutions, as well as on the continent. See Heisel, Ph.D. Training.

[54] See Heisel, Ph.D. Training.

APPENDIX

TABLE A-1:
List of Countries Included in the Rate of Return Survey

Angola	Mali
Benin	Mauritania
Botswana	Mauritus
Burkina Faso	Mozambique
Burundi	Namibia
Cameroon	Niger
Cape Verde	Nigeria
Chad	Rwanda
Congo-Brazzaville	Senegal
Ethiopia	Sierra Leone
Gambia	Somalia
Ghana	South Africa
Guinea	Sudan
Guinea-Bissau	Swaziland
Ivory Coast	Tanzania
Kenya	Togo
Lesotho	Uganda
Liberia	Zaire
Madagascar	Zambia
Malawi	Zimbabwe

TABLE A-2: List of Universities Included in the Survey

UNITED STATES:
University of Arizona*
University of Arizona*
Boston University*
University of California-Berkeley*
University of California-Davis
University of California-Los Angeles*
Clark Atlanta University
Colorado State University*
Columbia University*
Teacher's College, Columbia
Cornell University
University of Florida*
Florida State University*
University of Georgia
Howard University
University of Illinois-Urbana
Indiana University
University of Iowa*
Iowa State University*
Johns Hopkins University
University of Kansas
Kansas State University*
Louisiana State University*
University of Maryland
University of Massachusetts-Amherst*
University of Michigan-Ann Arbor
Michigan State University*
University of Minnesota*
University of Missouri
University of Nebraska
New York University
North Carolina State University
University of North Texas
Ohio University
Ohio State University*
Oklahoma State University
Oregon State University
University of Pennsylvania
Pennsylvania State University
University of Pittsburgh
Purdue University
Rutgers University
University of South Carolina*
Southern Illinois University*
Stanford University*
SUNY-Buffalo
Temple University
Texas A&M University
Texas Tech University
University of Texas-Austin
Tulane University
Virginia Polytechnic Institute*
Washington State University
West Virginia University
University of Wisconsin-Madison*

CANADA :
University of Alberta
University of British Columbia
Dalhousie University
Ecole Polytechnique de Montréal (F)
University of Guelph
Universitè Laval (F)
University of Manitoba
McGill University
University of Montréal (F)
University of New Brunswick*
Memorial University of Newfoundland*
Queen's University*
University of Saskatchewan
University of Toronto
York University

* Denotes receipt of completed survey

TABLE A-3: List of Sponsoring Organizations and Other Corollary Information Sources Contributing to the Survey

The following list gives information regarding the major program initiatives that provide multi-year support for Ph.D. training in North America – what we have called "primary" support. These organizations provided data for the survey that complemented the information received from the sample universities. Staff from some of these organizations also spoke with us about their program's goals, including return of fellows. The list does not include organizations like the Population Council, which once provided multi-year support for Ph.D. study in the population sciences, but since the 1970's has mostly offered short-term fellowships. This has always been the case, of course, for the Rockefeller foundation's ADIA Program, which supports field research fellowships.

AFGRAD/ATLAS: Funded by the U.S. Agency for international Development (USAID) and administered by the Africa-America Institute (AAI), the purpose of these support programs are, according to the USAID website, "to strengthen leadership and technical abilities and enhance the professional performance of individuals serving in African public and private sector entities, including universities, research centers and other key development institutions." The African Graduate Fellowship Program (AFGRAD) began in 1963, largely to strengthen university systems on the continent. The African Training for Leadership and Advanced Skills Program (ATLAS) was inaugurated in 1990, and eventually succeeded the AFGRAD program. The USAID website states that ATLAS

> "provides opportunities for qualified candidates to pursue academic and undergraduate and graduate programs in the United States. The education and leadership skills ATLAS participants gain strengthens their ability to contribute to development efforts in their home countries in areas such as business administration, public health, agriculture, education, the environment, and democracy and governance.
>
> ATLAS coordinates a range of activities in the U.S. and abroad that focus on developing leadership skills, enabling participants to apply their knowledge to development issues upon their return home. By targeting professionals in both the private and public sectors, ATLAS strengthens the capacity of institutions to promote sustainable development."

Thus, an explicit goal of these programs is to foster return to home country, which may itself be facilitated by "targeting professionals" already established in their careers at home. According to the staff of AAI, ATLAS focuses more on supporting Africans in M.A. programs, whereas its predecessor (AFGRAD) gave greater emphasis on Ph.D. training. AAI staff report that the return rate of Ph.D. recipients is quite high, which is also evident in our survey data. Currently, professionals from 26 African countries are eligible to apply for ATLAS awards. The program maintains information on the whereabouts and institutional affiliations of fellows and has just published a directory of all fellows since the start of the AFGRAD program in 1963.

J. WILLIAM FULBRIGHT FOREIGN GRADUATE STUDENTS PROGRAM: Established in 1946, the Fulbright Program is administered overseas by the United States Information Service in cooperation with U.S. embassies and binational commissions which serve as selection boards for fellows. The principal purpose of the program is to encourage cross-cultural understanding and exchange and by supporting students, faculty and other researchers to pursue their scholarly interests at U.S. institutions of higher education. Africans study in the U.S. as master's, doctoral or professional degree students under the Foreign Fulbright Graduate Students component of the program, and postdoctoral fellows on faculty exchanges under the foreign Fulbright Scholars component. In addition, the Hubert Humphrey Fellows Program targets mid-career professionals with the potential for national leadership. Similar in some ways to ATLAS/AFGRAD, many African recipients of Fulbright awards are professionals seeking to upgrade their training. The program does not favor any particular fields, and supports study at a variety of levels, including the Ph.D., but rarely supports the full-term of Ph.D. study.

Return rates are quite high among fellows as indicated by our survey. However, neither the central U.S. Information Agency office in Washington, nor the administering organization (the Institute for International Education) aggregates data from the individual country offices. We distributed our survey form to all U.S.I.S. offices in the region, but received a rather lukewarm response rate from busy Cultural Affairs offices. Several, however, provided very useful data.

JOINT JAPAN/WORLD BANK GRADUATE SCHOLARSHIP PROGRAM (JJ/WBGSP): Since 1987, the Japanese government has funded this program through the World Bank to train mid-career professionals from developing countries in fields related to economic development at universities located in World Bank member countries (including the U.S. and Canada). Support is provided at both the M.A. and Ph.D. level. The program has recently published a study of the whereabouts of former fellows between 1987 and 1992, as well as a directory of fellows up to 1997. Africans are well represented in the program, gaining the highest number of fellowships in every year since 1990. Return is a principle goal of the program. According to the study mentioned above, "the goal of the JJ/WBGSP program is to prepare scholars for an effective development role in their home countries or regions." The program measures success not strictly in home country return but more broadly as to whether fellows are working at institutions involved in international development (including the World Bank itself).

CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA): An agency of the Canadian government, CIDA provides fellowships, including at the Ph.D. level, to nationals of developing countries that are eligible for Canadian Official Development Assistance. It supports study both at universities in Canada and third countries. CIDA also runs the Canadian Fellowship Program for French Speaking Countries including francophone countries in Africa. The purpose of the program is both to improve relations between Canada and these countries, as well as to support development (especially in areas such as the training of trainers, women, private sector management, and public administration). According to a recent National Report on International Students in Canada, funding for CIDA fellowship assistance has steadily declined since the early 1990's. Extrapolating from data provided in this report, in 1995-96, Africans (including those from North Africa) received 44% of Canadian fellowship at all levels of higher education. According to our study, Ph.D. recipients with CIDA support show a very high rate of return after graduation (88%).

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE (IDRC): A corporation created by the Canadian Parliament, IDRC provides support for the training of scientists, managers, and planners from developing countries, including Africa. However, not all recipients of IDRC fellowships attend

Canadian universities B they may also study in their region or in third countries. While a recent brochure states that most IDRC funding was directed to the Masters level, this was true only in the 1980's. A recent National Report on International Students in Canada shows that funding for Ph.D.'s exceeded support for Masters from 1991-1996. However, more significant is the fact that overall numbers of fellowships supported decreased for both levels from the previous five years (1986-1990), with Ph.D.'s declining from 229 to 189.

IDRC awards are not open to a general application procedure. In almost all cases, awards are made to individuals associated with an IDRC project and are expected to return to work on that project upon completion of their studies. This "self-selection" would lead one to assume that most IDRC fellows will return to their home countries, and this is borne out by our survey (with a return rate of 91%).

KELLOGG FOUNDATION: Through its International Study Grants Program in Southern Africa, the Kellogg Foundation has supported 212 students for advanced degrees (mostly Ph.D. and some M.A.) between 1987 and 1996. This includes long-term support, where the foundation is the primary funder, as well as short-term support. The program covers the countries of South Africa, Zimbabwe, Botswana, Lesotho and Swaziland. Most fellows attend Ph.D. programs in North America. The foundation has tended to favor study in the fields of rural development and agriculture, and more broadly sees the program as part of an effort in nurturing leadership. According to the program's website, most recipients of Kellogg support are identified by foundation staff "from Foundation-aided projects and new program areas. These individuals are invited to apply for professionally rewarding educational experiences that will support program development."

Thus, fellows selected by Kellogg may be very well predisposed to return. Foundation staff reported to us that over 90% of their fellows return to their home countries. (The number of Kellogg fellows in our sample is too small to provide useful comparative data). Kellogg staff also mentioned to us that in order to further facilitate return, they are establishing a program on re-entry for fellows and starting up an alumni listserver. According to their website, "The Study Grants program has a dual commitment to the fellow's home institution as well as to the fellow. Linkage and communication with the home country are reinforced by requiring that data gathering and course work

research be carried out at home. This requirement helps address the issue of 'brain drain' from developing nations. The number of Kellogg fellows who return to their home country is among the highest for international programs of this type." Thus, Kellogg is quite self-conscious about questions of return and attempts to include elements that facilitate return into its program.

THE INTERNATIONAL ORGANIZATION FOR MIGRATION (KENYA): The IOM offers a variety of forms of assistance to African nationals living in the U.S. and Canada who wish to return to Africa to work in specialized and professional jobs through its Return and Reintegration of Qualified African Nationals (RQAN) Programme. Although IOM does not fund graduate education programs for African citizens in North America, their database contains exactly the type of information sought in our survey on the educational history and current professional activities on their clients. The completed survey received from the IOM contributed information on 46 cases to the database.

TABLE A-4: Survey Instrument for Stay and Return Rate of African Ph.D. Recipients: The Social Science Research Council

NAME OF INSTITUTION: _____

Discipline	Funding Source	Race	Gender	Country of Citizenship	Year of Ph.D.*	Year of Birth

Current Location (Country Only)	Current Profession	Current Institutional Affiliation

*The Survey covers sub-Saharan Africans who received their Ph.D.'s between 1986 and 1996. Please feel free to make photocopies of the questionnaire to accomodate the number of your graduates.

TABLE A-5: Return Status by Country for All Ph.D.'s in Survey, 1986-1996

50% OR GREATER RETURN "HOME"	TOTAL PH.D.'S	KNOWN RESIDENCE STATUS	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
BENIN	4	2	50	50	50		
BOTSWANA	19	18	95	94		6	
BURKINA FASO	25	24	96	79	13	8	
BURUNDI	14	14	100	57		43	
CAPE VERDE	2	2	100	100			
CHAD	2	2	100	100			
CONGO-BRAZZAVILLE	5		60		67	33	
GUINEA	11	10	91	70		20	10
IVORY COAST	42	27	64	59	4	37	
KENYA	155	113	73	65	5	28	2
LESOTHO	12	10	83	90	10		
MADAGASCAR	18	18	100	67	11	11	11
MALAWI	39	36	92	81	8	11	
MALI	17	13	76	77		23	
MAURITANIA	7	4	57	50		25	25
MOZAMBIQUE	6	5	83	80		20	
NAMIBIA	2	1	50	100			
NIGER	21	13	62	62		38	
SENEGAL	16	13	62	62		38	
SOUTH AFRICA	223	115	52	67		30	3
SWAZILAND	31	20	65	80	10	10	

Chart Continues on page 56

TABLE A-5 (CONTINUED): RETURN STATUS BY COUNTRY FOR ALL PH.D.'S IN SURVEY, 1986-1996

50% OR GREATER RETURN "HOME"	TOTAL PH.D.'S	KNOWN RESIDENCE STATUS	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
TANZANIA	58	43	74	79	2	19	
TOGO	24	19	79	68	5	26	
UGANDA	54	29	54	79	3	17	
ZAMBIA	38	28	74	79	4	18	
ZIMBABWE	51	42	82	83	7	10	
50% OR GREATER "STAY"							
ANGOLA	1	1	100			100	
CAMEROON	62	40	65	33	5	60	3
GAMBIA	7	6	86	33	17	50	
GHANA	166	102	61	34	5	61	
LIBERIA	23	19	83	21	21	58	
MAURITIUS	8	5	63	40		60	
NIGERIA	261	131	50	34	3	62	2
SIERRA LEONE	30	18	60	22	6	72	
SOMALIA	17	9	53	33	11	56	
DISPERSED LOCATION							
ETHIOPIA	89	53	60	47	4	47	2
RWANDA	16	14	88	36	14	43	7
SUDAN	92	62	67	48	5	35	11

Chart Continues on page 57

TABLE A-5 (CONTINUED): RETURN STATUS BY COUNTRY FOR ALL PH.D.'S IN SURVEY, 1986-1996

DISPERSED LOCATION	TOTAL PH.D.'S	KNOWN RESIDENCE STATUS	% OF TOTAL	RETURN STATUS (%)			
				HOME	AFRICA	STAY	OTHER
ZAIRE	33	24	73	42	17	42	
OTHER							
GUINEA-BISSAU	4	1	25				100

SOURCE: SSRC Rate of Return Survey, 1998.

TABLE A-6:
National Science Foundation Field of Study Classifications

The field of study categories listed below are the same as those that appear in the NSF Survey of Earned Doctorates (SED). The NSF scheme was employed in this study to facilitate comparison between the SSRC survey and the SED. Bold-face, upper-case terms represent the "Broad Field" classifications, and lower case terms indicate the corresponding "General Field" classifications subsumed under each Broad Field as used in Tables A-10 and A-11 in this report.

In the SSRC survey, the field of study was usually reported according to the name of the academic department in which the Ph.D. was earned. In a few cases, it was reported according to dissertation title or keywords. In the latter case, an attempt was made to identify the name of the department in which the degree was earned. Coding of the field of study variable was accomplished by consulting the "specialties list" used in the SED (copy attached to this Table). For example, a degree reported as "Microbiology" – No. 157 on the specialties list – was coded as "Biological Sciences" (general field) and "Life Sciences" (broad field). It should be noted that the NSF does not subdivide the broad fields of Education and Engineering into constituent general fields. For example, there is no general field category for Civil, Mechanical, or Electrical engineering, etc.

A word of caution with respect to the classification of several fields of study strongly represented in the database. At the "general field" level, more Africans in our survey received degrees in the Agricultural Sciences than in any other field. By employing the NSF coding scheme, however, one should be aware that the specialty "Agricultural Economics"– No. 000 on the specialties list, and the most widely reported degree field in our survey – is coded as an Agricultural Science, and not as an economics-related social science. In addition, one should note that the specialties "Agricultural Engineering" and "Agricultural Education" (i.e., Extension Education) – two other widely reported degrees - are coded under "Engineering" and "Education" respectively, and not as Agricultural Sciences.

Education

Engineering

Humanities
Foreign Language/Literature
History
Letters
Other Humanities

Life Sciences
Agricultural Sciences
Biological Sciences
Health Sciences

Physical Sciences
Atmospheric Science
Chemistry
Computer Sciences
Geological Sciences
Mathematics
Physics
Other Physical Sciences

Professional Fields
Business Management
Communication
Other Professional Fields

Social Sciences
Anthropology
Economics
Political Science
Psychology
Sociology
Other Social Sciences

Other Fields

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